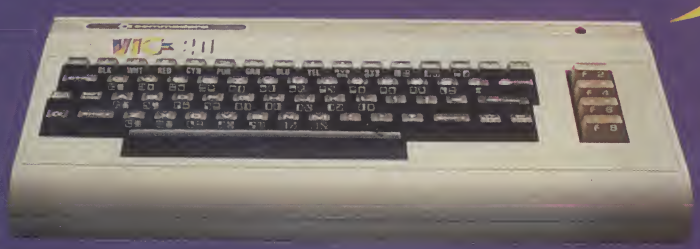
Vic COMPUTING

M/C routines
Butterfield returns!

THE MAGAZINE FOR COMMODORE'S SMALL COMPUTERS MARCH 1983 VOL 2 ISSUE 4 95p

"HELLO. GLAD TO BE ABLE TO HAVE A WORD WITH YOU. SEVERAL WORDS, ACTUALLY, BECAUSE INSIDE THIS ISSUE YOU'LL FIND REVIEWS OF PLUG-IN BOXES THAT MAKE A VIC TALK. (AND NOT BEFORE TIME.) ALSO THE RETURN OF BUTTERFIELD, VISITING VIC VIDEO. AND TWO FILING PACKAGES COMPARED. AND A 64 PAGE (THE 64 IS NOW BEING MADE IN THE UK — OR WILL BE, SOON). AND A SURVEY OF ASSEMBLY-LANGUAGE AIDS. AND THERE'S MORE . . ."



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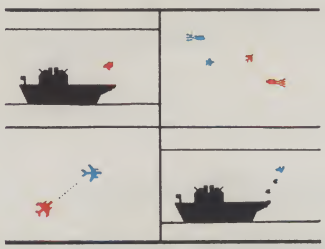

"A REAL ACTION SHOT OF THE GAME"

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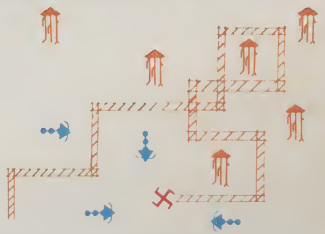


"A REAL ACTION SHOT OF THE GAME"

NEW NEW NEW NEW NEW NEW NEW NEW

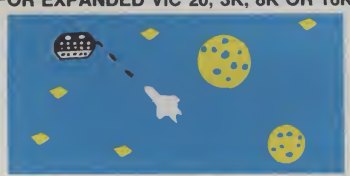
SEA INVASION

FOR THE UNEXPANDED VIC 20

Fight off the attacking sea creatures for as long as you can. Shoot the whale for a surprise score. Watch out for the crabs, starfish, & octopi !!!!!!!!!!!!!!!!!!!!!!!!!!!!

MOONS OF JUPITER

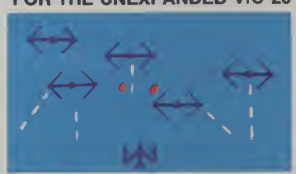
FOR EXPANDED VIC 20, 3K, 8K OR 16K



You are the commander of a fleet of destroyers... Looking on from the safety of mother ship, you send in one destroyer at a time to blast a passage through the moons of Jupiter. Your destroyers have to dodge, and blast the "U.F.O's"... Watch out for the 'Gologs', they can smash your destroyers, but you cannot harm them ....

SPACE ATTACK

FOR THE UNEXPANDED VIC 20



Space attack is a game of skill, you, as the pilot of an intergalactic battleship, have to fight your way through wave after wave of various alien space ships

MIND TWISTERS

FOR UNEXPANDED VIC 20
FOUR GAMES TO STRETCH YOUR BRAIN

Blackjack, Decipher, Four Thought and Teaser are our computerised versions of very popular home games and will test your mental agility and skill for many a long hour.

BLACKJACK:-
You start with £1,000, the objective being to break the bank, to do this you have to win (including your starting money) £20,000.
Instructions: You have to score nearer (but not over) 21 than the computer does. The computer deals your first card, you then place your bet and hit the return key, the computer then deals your second card. If you want another card hit the "C" key, if not, hit the "S" key.
Points: Ace = 1 or 11, Jack, Queen, King = 10.
Scoring 21 points with 2 cards — you automatically win.
Scoring 21 points or less with 5 cards — you automatically win.
Draw — the computer wins.
Your kitty is automatically adjusted win or lose. If you lose all your kitty — game over.

DECIPHER:-
You have to guess what combination of colours the computer has selected — to enter a colour just hit the colour button on the computer, when you have entered your 5 choices of colour, the computer will display (A) Nothing at all = None right, (B) Black or White Squares or Both — For every black square you will have a correct colour in the correct position, for every white square you will have a correct colour in the wrong position. If you cannot find the complete combination, it will be displayed when you have had twelve attempts.

FOUR THOUGHT:-
You have to make a line of four squares — horizontally, vertically or diagonally BEFORE the computer does, taking turns to take a square (squares can only be placed at the bottom of the grid, or on top of another square). **Keys:** Hit the number key of the column you want your square dropped in then hit the return key.

TEASER:-
The aim of the game is to score "15" BEFORE the computer does, using any combination of 3 boxes. If you cannot score "15" then you must try and stop the computer from doing so and force a draw. **Keys:** Hit the number key of the box that you want (you can only select an empty box).

MULTISOUND SYNTHESIZER

FOR THE UNEXPANDED VIC 20

The Vic Multisound Synthesiser is very flexible and can be played in more ways than can ever be explained here, to create music and special effects. For example, create any tune, up to 255 notes (after following appropriate instructions), then press "F1" or "F3", then key "9" and enjoy the added effect. Now hit "+", listen to the difference. For a surprise — hit "—". Now add a melody over the top — hit key "8" then "7" — now play a melody, or experiment. *Have fun!*

Our games are available from all good home computer shops, including: all Laskys branches, Micro C, inside Currys at: Birmingham (233 1105), Leeds (446601), Luton (425079), Nottingham (412455), Southampton (29676), inside Bridgers at: Bristol (650501), New Malden (01-949 2091), and at: Leicester (546224), London (387 9275), Manchester (834 0144), Micro-C, Chromasonic Electronics, 48 Junction Road, Archway, London N19 5RD (01-263 9493/263 9495, Telex 22568), Maplin Electronic Supplies Ltd, P.O. Box 3, Rayleigh, Essex (0702 552911/554155), Gemini Electronics, 50 Newton Street, Off Piccadilly, Manchester M1 2EA (061-236 3083), Gamer, 24 Gloucester Road, Brighton (698424), Vic Centre, 154 Victoria Road, Acton, London W3 (01-992 9904), Metyclean, 137 The Strand, London WC2 (01-240 2321), Metyclean, 177 London Road, Croydon (01-686 8626), Metyclean, 92 Victoria Street, London SW1 (01-828 2511).

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Entire staff plus Rosie Waites, Becky Manasseh, Parody Morgan, Ian Litterick

Telephone: 01-607 9489 (all departments)

Vic Computing is published six times a year by the Paradox Group, 39-41 North Road, London N7.9DP. Annual subscription: £6 per year (UK), £IRL 8.50 (Eire), £9 (Europe), £16 (rest of world). Printing by Thamesmouth Printing Co Ltd, Southend-on-Sea, Essex; phototypesetting by Carlinpoint Ltd, London WC2E 9NW.

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Publisher's guarantee: There are no mistakes in this magazine except this one.

Best sellers

Commodore has produced a list of "the top twenty best selling Vic-20 software products" though curiously it's *only* Commodore's software that figures). The list is for February 1983.

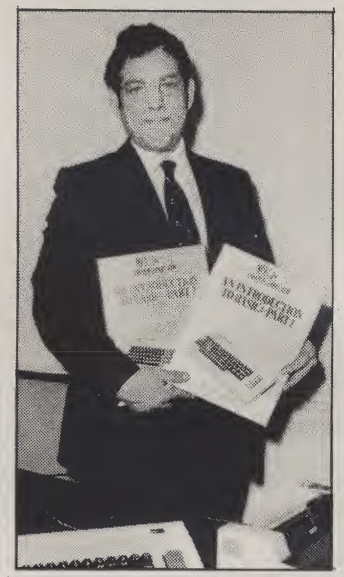
Introduction To Basic Parts I and II were written by Prof Andrew Colin of Strathclyde University. Sales of Part I so far have exceeded 100,000 worldwide. Sad about the photo.

The top game was **Hoppit,** written by 18-year-old Darryl Mattocks in his bedroom during his summer holidays — he's now reading computer studies at Oxford University.

And here's the good news — several of the titles that made the top twenty came in through the window. According to Gail Wellington at Commodore, **"Blitz** came in one morning with a letter attached to it from a 16-year-old named Simon Taylor. He asked our technical department if they could use his program and did they need any help?!

"Gortek & The Microchips came to us last June. Apparently three primary school teachers had combined to write a short story to teach computer awareness to young children. They contacted Commodore to ask our advice about where to publish it and we took one look at it and said 'hey you've got a commercial product here. So we began working together. That was last June and now they are working on six more titles".

Position	Title
1	Introduction To Basic I
2	Introduction To Basic II
3	Blitz
4	Hoppit
5	Star Battle
6	GCE revision — English
7	Adventure Land
8	Mission Impossible
9	Omega Race
10	Gorf
11	GCE revision — Maths I
12	Strategic Advance
13	GCE revision — Chemistry
14	Sargon II
15	Gortek & The Microchips
16	Avenger
17	Simplecalc
18	Voodoo Castle
19	Pirate Cove
20	Know Your Own IQ



Coming soon?

Back in January the American consumer electronics business had one of its giant-size jollies at Las Vegas. The details just missed our last copy date: but some of them seem just too interesting to skip.

Especially the Commodore stand. For a start there was the SX-100, a prototype portable version of the 64. And there was a kind of 'maybe' prototype, a Vic with a built-in miniature TV. And there was a hand-held computer, the HHC-4.

That one looks like the usual offerings in this field, as defined by the Matsvshita/Tandy and HP HHCs. You get a QWERTY button keyboard, numeric keypad, 24-character single-line liquid crystal display, and a basic 4K RAM (3K available to the user). It expands to 16K. Basic is in 20K ROM.

It fits into an expansion box for a mini-printer to plug in. That extension also includes an integral RS232 interface via which you can attach cassette, 'real' printers, or even a link to a Vic or a 64.

That's the interesting bit — you do need the RS232 at both ends of the link, but you should be able to use the HHC-4 to talk to your existing computer. It starts at $199 in the States. And the UK? "Probably later this year" we were told. The perennial Commodore response...

The HHC-4 is the only live product of the three. The Vic with integral screen is described only as an experimental prototype, and pretty ugly it looked to us. The screen (Sony's Watchman TV) is embedded top left, the main keyboard has been shifted right to make room, and the function keys go along the top.

The portable 64 looked nice, though — a lower-cost, lighter, neater alternative to the Osborne. Target prices quoted are $995 for a single-disk system (yes, disk drives built in, naturally) with monochrome display (looked like an ordinary TV set). Two disks and colour were suggested as around $1,300.

Essentially Commodore has taken the 64's gubbins out of the keyboard, which is now a very flat and unspacious panel retaining the standard Vic/64 keys and layout. That forms the top of a box à la Osborne, and the box stands up on its handle to show you a 5in TV display and one or two built-in 170KB disk drives.

All the 64 electronics seem to have been retained — 64K RAM, 16-colour graphics, SID sound chip. The unit on the stand was running through the usual 64 demos, including sprites: the colour wasn't great, but then it never is with the US NTSC standard. The sound was a bit tinny too.

Still, it's a neat machine. Yes please, Commodore.

More micros: 1,200,000 home computers costing between $200 and $500 will be sold in the States this year, according to a market research firm called Yankee Group.

Sense of perspective: "We are selling you a Gucci belt for the price of a piece of rope." Modest Jack Tramiel, founder and vice-chairman of Commodore, talking about his company's products.

Colour problems? The most common complaint received by Commodore's Service people appears to be poor colour or lack of it. First let us say that the modulators should not be swapped indescriminately. The modulators have been matched before despatch to their Vic.

If you have a problem with the colour, it may usually be resolved by a slight tweak of one of the two potentiometers situated at the top of the pcb in a central location (R7 and R32). Only a very slight movement will be necessary.

Now, if you try fixing this yourself you may invalidate your warranty — so don't do it unless you're really confident! We're telling you how simple this adjustment is so that you can point it out to your dealer.

Buy a neat box . . .

Despite the Atari (boo!) in the pic, this thing might be worth looking at. "The Kralex Microstation is geared for growth — a fact that most other systems ignore", declaims the manufacturer: "any computer system will expand and a workstation designed for a keyboard and a VDU will no longer cope when such essential items as disc drives and printers are added . . ." Oh, really?

This one has an aluminium frame with laminated panels and shelves. It's not cheap — it starts as a simple desk, 3ftx2ft, at £125. But its top looks to be at a comfortable height for keyboard operation, shelves can be fitted, and the work-surface can be extended with an add-on desk and/or more shelves. Putting it together takes minutes and no tools: so it might be a good buy for home or office use.

Contact 01-221 6227 for more information.

RUN/STOP stopped: We were recently looking for a way to disable the RUN/STOP key (basically to prevent someone inadvertently killing a program by mis-keying). **POKE 808,127** seems to work . . .

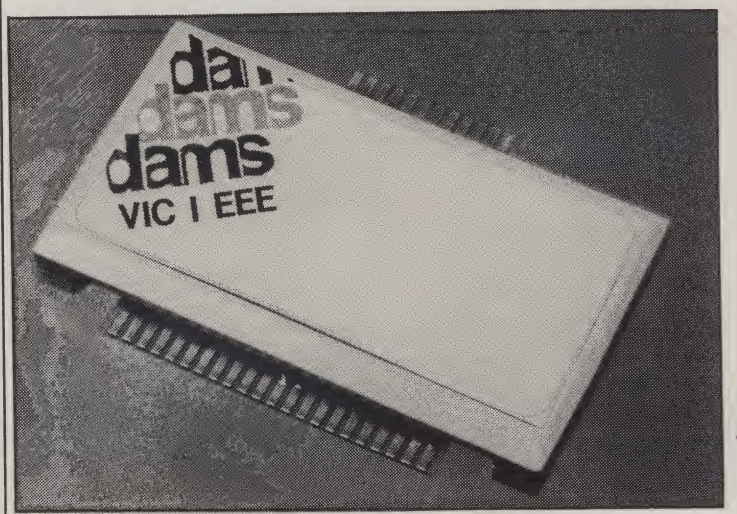
Or build one for £50!

Alternatively, try designing a 'workstation' for the Vic yourself. We'll pay £50 for a simple, sensible DIY unit that is sound, strong, and capable of coping with a Vic, printer, disk, cassette and TV set — not to mention storage for disks and cassettes — and some working space for papers and listings.

The unit might be a fold-up-and-pack-away cabinet for the house, perhaps to sit on a table. Or it could be a complete DIY desk unit, or something between those options.

Send in plans and instructions, with photographs if possible (we'd like some evidence that it works!). Closing date is 1 June 1983, and we'll build the winning design to put on our stand at the Commodore Show.

Address your entry to Workstation Competition, Vic Competition, Vic Computing, 39-41 North Road, London N7 9DP. And no direct copies of manufactured products, please!



The cartridge in the picture comes from Dams Business Computers of Liverpool. Dams' PR man says it "looks set to take the Vic computer market by storm": well, we'll see. The Dams IEEE cartridge interface plugs into the back of Vic to allow you to plug in disk drives, language packs, printers and other peripherals that require an IEEE connection. Several Vics could use it to run off one disk drive, a particular advantage in the education field — especially at a price tag of £49.95 (plus VAT). A version for the Commodore 64 will be available "very shortly".

Fair Fare

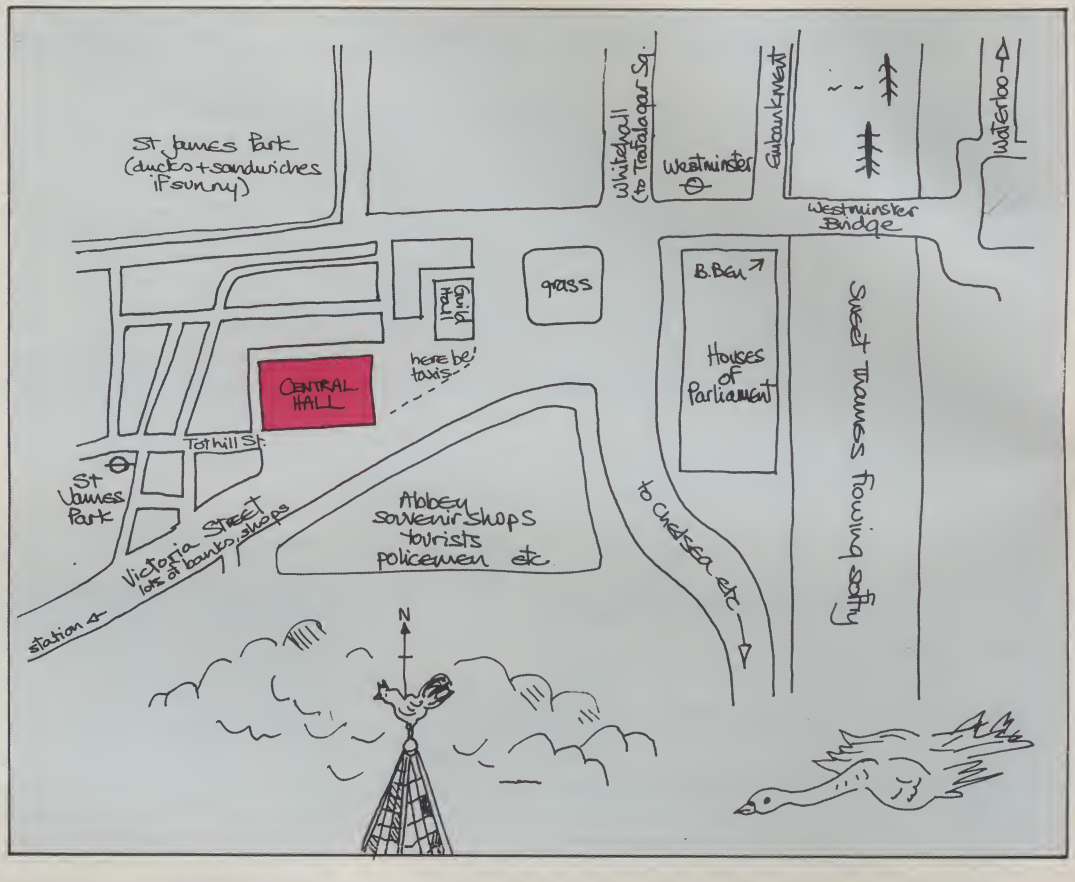
The Fourth London Computer Fair is being held in the Central Hall, Westminster on 14-16 April. We'll be there — come and see us!

The Fair is cheap for exhibitors and it has a generally cheerful, welcoming atmosphere for enthusiasts — not a lot of big-company razzmatazz, few if any buxom ladies display most of their all if you'll just press *this* key sir: just 50 or 60 small companies and computer clubs. Should be good.

The Central Hall is a large and externally forbidding building in that square with Westminster Abbey on one side, the Mother of Parliaments at a corner, and Westminster Bridge opposite.

Loads of buses (ask for the Abbey or the Houses of Parliament); Victoria station is ten minutes walk away and Waterloo is about 15; tubes to St James Park or Westminster. Car parking is generally lousy, but look around the back streets to the south of Victoria Street.

If you have one of the London street maps, you'll find the Fair on page 148 of Nicholsons (map ref. G20).



Fly Snatcher
(VIC-20)

Our Long Established Best Seller!

You are in a field with bushes, and only flies to live on. You must survive by snatching each fly and then diving into a bush or the edge of the field. However, a weasel also lives in the field and is determined to eat you, he will move in any direction and will even jump through bushes to reach you. Each session of fly snatching you survive leads to another with even more flies and a faster weasel.

- ★ Unexpanded VIC
- ★ Joystick or keyboard
- ★ Difficulty increases on each page
- ★ World Record 126 flies — can you beat it?

Alien Hunter
(VIC-20)

Experience the safari of the future.

Hunt the alien moving around your sector at the speed of light. Destroy the alien's drones as he lays them in your path, whilst avoiding rogue asteroids. Watch out! Your fuel is diminishing and the pace is accelerating. Your chances of survival are slim.

- ★ High speed machine code action
- ★ Unexpanded VIC
- ★ Joystick control
- ★ 10 levels of play
- ★ High score display
- ★ Fuel replenishment
- ★ Fire action in any direction

Double Trouble
(VIC-20)

This appealing game enables two players or one player versus VIC to enter a high speed world where reactions and judgement are paramount to survival. Players must deflect their ball into fruit-like objects that appear despite "Schizophrenic Spike" who roams the play area. The game would be simple but for the growing walls and court boundaries and . . .

!! Be thankful this is only a game !!

- ★ Unexpanded VIC
- ★ High speed machine code action
- ★ 1 or 2 players
- ★ Numerous options of play
- ★ Score display
- ★ Life display

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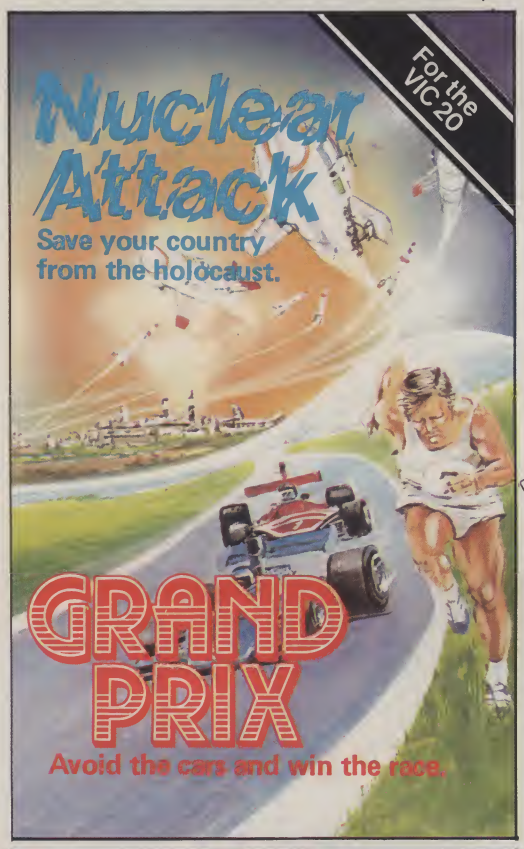

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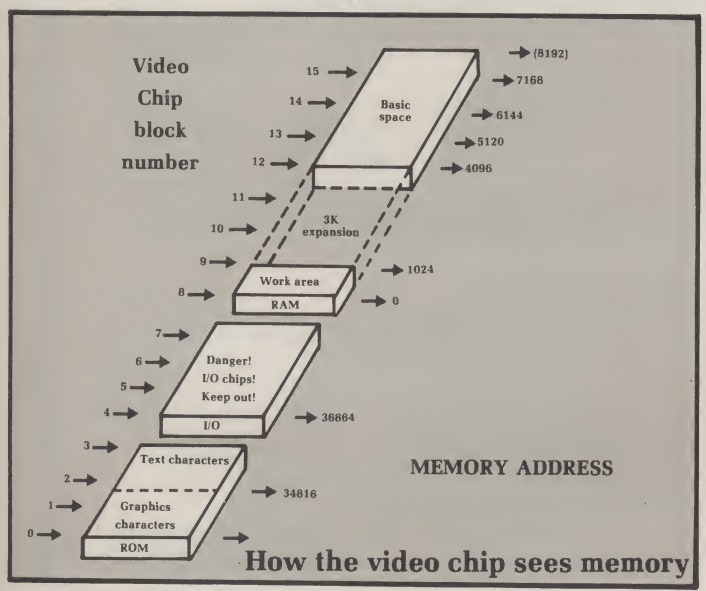
Visiting Vic Video: Part 1 of a series

by Jim Butterfield

In which the traveller discovers a new way of viewing the computer's memory: through a video chip, but hopefully not darkly . . .

If we want to put the Vic-20 video chip to work, we must learn to view things from its standpoint. It sees the computer memory in a way that differs significantly from the way the processor chip sees it.



How the video chip sees memory

The video chip sees only the memory shown here. Even if you have expanded your computer to include lots of extra RAM memory above address 8191, the chip can't see it. The chip sees only the character ROM, in blocks 0, 1, 2, and 3; and the lowest 8K of RAM (in blocks 8 to 15).

Blocks 4, 5, 6, and 7 would look at the input/output area, but take my advice: don't do it — no good will come from these addresses.

What the chip wants

The video chip wants to dig out two things from memory and deliver them to the screen. It wants to look at 'screen memory' — usually the characters you have typed. On a minimum 5K Vic that's block 15.5, which corresponds to decimal address 7680 or hexadecimal 1E00.

Did I mention that for screen memory we can look at 'half-blocks'? It makes sense, since only five hundred or so characters are needed to fill the screen. By the way, the official name for screen memory is the *video matrix*.

Whatever you call it, if you POKE 7680,1 on an unexpanded Vic you'll see the letter A appear at the start but you'll usually want to stay with even numbers: a full character set including the reversed characters takes up 2048 bytes of memory.

The official name for the character set is character cells, although the term *character base* is also coming into use. Whatever you call it, you can't POKE 32768,55 and expect anything to happen — the standard characters are in ROM and cannot be changed: they are carved in stone, or silicon to be more exact. If you want to switch to custom characters, you'll need to stage them in RAM and tell the chip which block to take them from.

There's a third thing that the chip uses, but it doesn't come from regular memory in the usual way. That's the screen colours (the *colour matrix*). This colour information for each character comes through the back door, so to speak, and we won't worry about the details to much here. When we need to, we'll set the colour and assume everything will work.

Architecture

Looking at the diagram we can begin to see why the Vic does its odd screen switch when you add memory. In the 5K Vic, the screen sits at the top of memory — and that's the highest address that the video chip can see (block 15.5).

If we add 3K RAM the screen can stay where it is above the Basic RAM area. But if we add 8K or more, the video chip can't see that high . . . and the screen memory must flip down to the bottom where it won't get in the way of your Basic program. Which bottom, you may ask? It turns out to be block 12, which is memory address 4096 or hexadecimal 1000 — even if the 3K expansion is in place.

You can move this around yourself, of course, and we'll be doing that in just a few moments.

The trick is mostly location 36869, which contains instructions on which blocks to use for screen and characters.

We do it this way: select which blocks you want for each. Now, multiply the screen block (not including the 0.5 if you're using it) by 16 and add the character block. POKE the result into 36869, and the job's done. We'll need to do a couple of other things for sanity's sake: but that's the main job.

The 'half-page' for the screen memory goes into location 36866: you invoke it by adding 128 to the 'column count' if you want to go the extra distance. That means that under normal circumstances (22 columns) you want to POKE 36866,22 for an exact block number, and POKE 36866,150 to nudge to the extra half-page.

An adventure

Let's do something useless but fun. We'll move the screen memory down to address zero (that's block 8). We can't play with this area — too many important things are happening there — but we can watch interesting things in progress, like the timer and the cursor doing their peculiar things.

First, the calculation: we want the character set to stay the way it is (block 0 for graphics), and we want to move the screen memory to block 8. Eight times 16 plus zero gives 128. No half block, so 36866 should be 22.

A preliminary step: let's make sure that we don't print white-on-white by clearing the screen and typing:

```
FOR J = 37888 TO 38911:
POKE J,0:NEXT J
```

Ready? Here goes: enter **POKE 36869,128: POKE 36866,22**. Press RETURN . . . no, we haven't crashed, but we'll have to type blind from now on.

First, examine the fascinating and busy things that are under way. The timer is working away in three bytes: at first glance, only one by seems to be changing. The cursor flash is being logged and timed somewhat below. And if you start typing, you'll see a whole new series of working values coming into play. Indeed, if you can type blind, you might try **PRINT 1234 + 5678** and watch the flurry of activity.

If you type a lot, the screen will start to scroll and the display will start to vanish as the colours are rolled off the top.

Restore everything to normal by holding down RUN/STOP and tapping RESTORE key.

Conclusion

This has been a first exploration . . . but you may feel that you understand better what the video chip is up to. Indeed, you may feel that you have gained some measure of control.

There's much more to be learned. This is a start: three more articles in the series to come!

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Vic as filing cabinet?

an introduction and two reviews

by Chris Preston

One of the most obvious uses for a small microcomputer is as a filing system. It can store information on your record or magazine collection, a club secretary might use it to hold membership details, a radio ham could keep records of contacts — a friend of mine uses a computer for just this purpose, and tells me that people are very impressed when five seconds into the conversation he announces that they have previously spoken on January 3rd 1981!

There are several such packages available for the Vic now: this review looks at two of them.

It might be an idea to go into a little detail on the operation of a filing system, for the benefit both of readers who are thinking of buying one and those who are trying to write one.

The centre of any filing system is obviously the file itself, which holds all the information in the system. A complicated database may have a number of files linked together in various ways; but to keep things simple we'll stick to considering just one file. And to explain the workings of filing systems we will take the example of a computer dating bureau.

A file is held on disk or cassette, and consists of a number of *records*. In our case each record would contain information on one person who has enrolled with the bureau.

The record is split into a number of *fields*, where each field holds one piece of information on the person: name, address, interests and so on. Although the different fields in a record will vary in size (a person's age may occupy three characters in the record, while 30 may be reserved for their name), the corresponding fields in different records will always have the same length — except on very powerful systems, and we're not talking about them here. So the 'name' field in every record on the file will always be 30 characters long. This is just because it is easier and quicker for the computer to find a particular record in the file if they are all the same length.

Moreover, the *order* of the fields in the record will always be the same. Again that's to make it easier for the computer to know where the field is.

Fixing the record

Apart from its length and position within the record, a field also has a *type*. Typically this will be *alphanumeric*, where you can enter any characters: or *numeric*, where you can only enter numeric characters: or *date*, which is used (would you believe) to hold dates. This last is a special kind of numeric field, because it is split into 'subfields' — day, month and year — each with its own rules (30 days hath September . . .): and the system will check that you entered it correctly.

The main purpose of having different field types, in fact, is to give the computer more chance to tell if you have made a mistake when you are entering data into the field.

The implication of all this is that once a file has been created, it can be a time-consuming task to reorganise it to add extra fields or to change the length of a field (although any respectable system *should* allow you to do this). So when you are setting up a file it is important to plan exactly what you want to do beforehand.

Let us imagine we are really going to create a computer dating file, and decide what we want on the file. We might end up with something like this:

Field	Length
Christian name	20 characters
Surname	20 characters
Address	80 characters
Tel. number	12 characters
Sex	1 character
Date of last date	6 characters
Interests	100 characters

Maybe you might have some other fields, but this lot will do for our example.

The first thing you would do is to go though a **file creation** phase, where you tell the system the structure of the records. You can then enter some records — a **data entry** phase.

Subsequently you could **add** or **amend** or **delete** existing ones. To change or erase you have to select a particular record, which is done by means of what's called a *key field*: this might be one of the 'information fields in the record (such as the person's surname), but more commonly it is a special code of some sort — an account number or membership number, say. On a good system you can use *alphanumeric* keys; smaller systems may insist that the key field is a numeric *integer*, between 1 and 2000 say.

Sort that lot out

Now we come to an important concept: the **sorting** operation. You want to be able to enter people into your system in any old order, as they come to you. But you will want to get information *out* of the system in some special sequence, say alphabetical order of surname.

Without any special help, it would take the computer quite a long time to get all the records out of the system in any particular order. So we arrange for the system to put the records into the correct order by means of a sort program.

This may actually change the order of the records; or the program may produce an *index* file which is used by the main filing system to find any particular record.

The most common way of sorting a file of people's records is into ascending alphabetic order of surname, because that is how we normally refer to people. The field which is used to determine the sort order is also called the *key field*, and in a decent system you can specify any field (not necessarily the first one in the record) as a key field, whether it is an alphanumeric, numeric or date field. And you should also be able to specify whether you want to sort into *ascending* or *descending* order.

For example, a businessman may want to produce a list of his customers in descending order of outstanding balance. That way he would be able to spot the worst offenders and write the nastiest letters to them. A really high-powered filing system will allow you to specify a number of key fields, thus enabling our businessman (who now has three branches) to sort his debtors list into descending order *within branch*. All the customers from the London branch would then come out after those from Birmingham but before the Manchester branch.

Getting it out

Suppose that we have sorted our file into ascending order of surname. We can now produce a listing of the file from a program called something like the **'report generator'.**

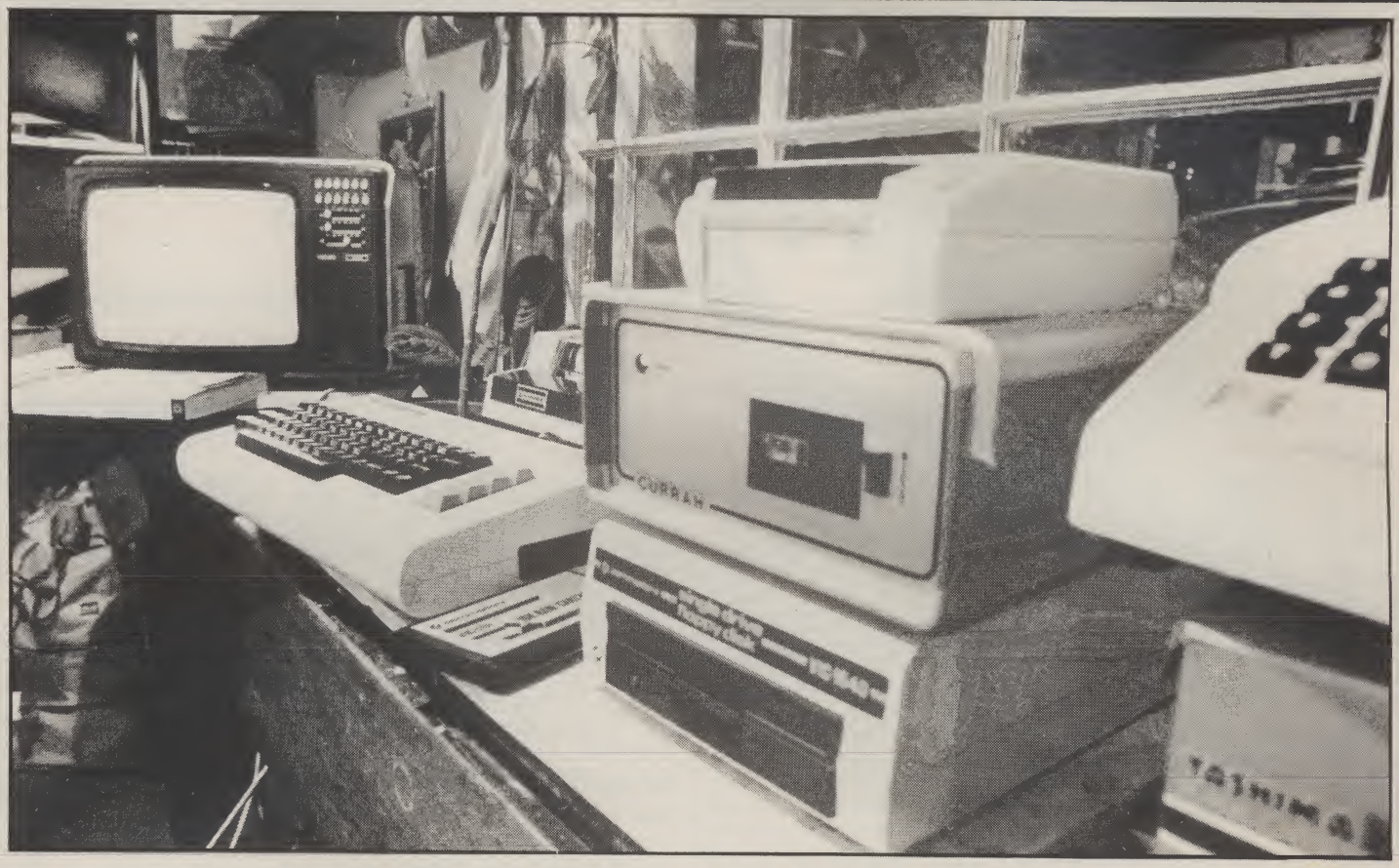
This does just what it says — it produces reports. It probably uses another file, called the 'report layout file' or somesuch; this tells it which fields to print, in which order, and how they are to be laid out on the page.

In many ways this is the most important program in the system, because it is the finished report which is seen by your managing director or bank manager or the dating bureau's client: and its quality may well decide whether you get the rise or loan or the enthusiastic response you were looking for.

The report generator may also be able to produce printed labels for envelopes: or this may be done by a separate 'mailshot' program. A good report generator can also do arithmetic on the various fields, to allow you to print totals for instance.

So we can use our system to produce the first report we need: an alphabetic list of clients. But we may need other reports as well from time to time, such as a list of clients in order of 'date of last date' field, so that we can devote special attention to Mr. Pocklington who has not had an encounter of any kind since 15 August 1945. Maybe we would have a word with our staff as to why this lamentable state of affairs was allowed to arise.

With most systems, producing reports in order by a non-key field can be a slow process: in that case it may be worth re-sorting the file using another field as a new key. If you are lucky, though, the system



you're using will let you produce a subsidiary index file to speed up this other report.

The last function of the report generator is to produce *selective* reports. This is probably the most common report on the dating system. Obviously when a new client comes to us, we want to be able to get a list of possible matches — say all our female clients under 35 and not previously married, interested in Wagner and Southern Death Cult, parachuting and beret-making and the legal position of the Australian aborigine. Probably not a long list, but never mind: we'll do our best, Mr Pocklington.

The reviews

So we end the introduction: now on to two particular examples of filing systems for the Vic. **Vicfile** is a disk-based package which needs a 16K expansion unit as well as a 1540 isk drive: **PIMS** is a cassette system, but it also needs memory expansion if you are to do anything at all useful with it.

This is not intended to be a comparative review — the disk-based Vicfile is obviously a more powerful system, but it isn't available to those without the resources (ie the cash) to run to disks. Instead we'll take a look at these two packages as examples of the genre — and consider them on their own merits.

PIMS from Cass Concerns is a cassette-based filing package that promises a lot.

But the first impressions were not good. You can usually judge a piece of software very effectively by its instruction manual — if this has been skimped, you can bet that applies to the program as well.

The PIMS manual consists of a tiny 12-page booklet — without page numbers, let alone an index or table of contents. The first words probably lay the vendors open to action under the Sale of Goods Act: "you have in your hands probably the most powerful program to run on the Vic-20 computer".

Apart from the fact I had only the manual in my hands, the program being on the bench at the time, this sort of hyperbole instantly turns me off. The manual is also full of spelling mistakes, and I do not regard the fact that the program appears to be Dutch in origin as any excuse.

Although the program is not a highly polished system, it does have a number of useful facilities. To get round the problem that a cassette is not a random-access device, PIMS reads the whole of the file into memory for manipulation. Apart from the fact that this limits the size of your file, it also means that as the file gets to a reasonable size you will run into garbage collection problems because the program is written in Basic. This also causes other problems, such as the fact that you cannot use symbols such as parentheses or commas in the data; they would cause the Basic INPUT statement to misbehave.

You can use the system to select records according to one criterion, so that you can list all customers who owe more than £1,000.

PIMS also allows you to do some arithmetic, to work out 15 per cent of a goods value for instance and put the result into a VAT field. The program also has a fuller calculation section, so you could calculate the total value of all the goods in a stock file, for example.

Sorting on PIMS is comparatively fast, since all the data is in memory. Though you only sort on one field, you can easily and quite quickly re-sort several times for different fields.

As far as printing is concerned, you do not have any choice as to layout: all the data is printed in columns.

PIMS is quite a limited system, but could be used in the home for fairly small fields. Most keen home programmers could produce something almost as good, however, with extra features in these tailored to their own needs.

The Official Option

VICFILE is a real contrast — a professionally-written and professionally-documented suite of programs. The manual is very good, with an introductory section for first-time computer users, a training section, and an operating section; and it has quite a good index too.

When setting up a new file, the program allows you to design the screen layout to be used actually to enter the data; it accepts fields as alphanumeric, numeric or date.

The system is a bit restrictive in that the key field must be numeric, say 1 to 1000. This means that you cannot specify "surname" as a key field. you can however sort on alphanumeric or numeric fields.

VICFILE has a powerful report generator, allowing you to set up the report layout you require by specifying which fields you wish to print and their positions on the paper. You can calculate totals of numeric fields automatically as required on the printout. The program has very good facilities for selecting records for printing, and for doing calculations in between fields and producing totals.

All in all, a very well written system which should be able to handle most people's filing requirements; even small businesses will be able to find many uses for it. Heartily recommended.

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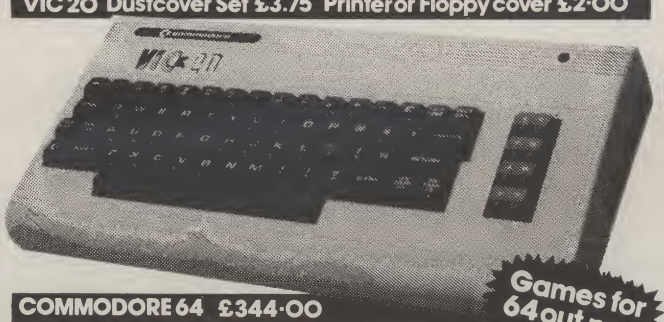

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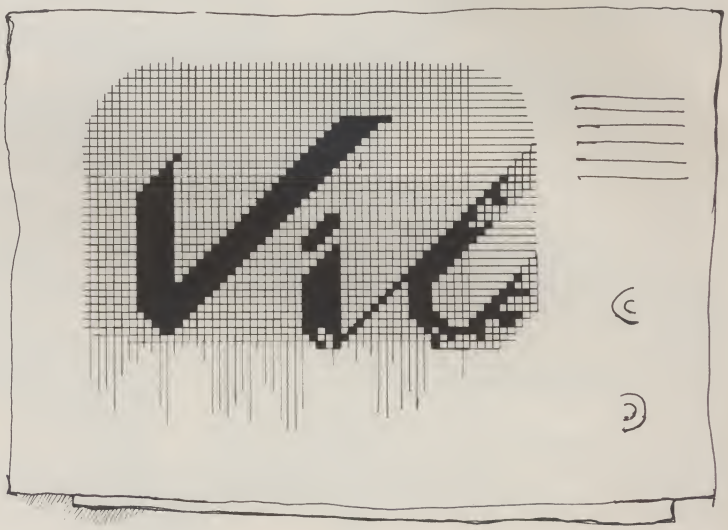
The Graphics Primer — Part Two



There's a feature of the Vic which has remained hidden to many users. This is mainly because no commands to use them have been incorporated in the standard Vic, although a cartridge is available for £35.

Of course I'm talking about high-resolution graphics, the ability to produce a close resemblance of something on the computer's screen. Vic's characters are made up of tiny dots: high-resolution graphics gives us full control of each dot (they are called pixels) and thus fairly accurate pictures or graphs can be drawn.

by Kevin Smart

Demo 1

```
1000 REM MODIFIED FROM 'LEARN COMPUTER PROGRAMMING
1001 REM WITH THE COMMODORE VIC' BY CARTER & HUZAN £1.95
1002 REM
1003 REM INITIALISATION OF HI-RES
1005 PRINT CHR$(147) CHR$(144): POKE 36879,79
1020 IF PEEK(36869)=253 THEN2000
1030 POKE 36869,253
1040 POKE 51,29: POKE56,29:CLR
1050 DIMF(8):F(8)=0:F(0)=128:F(1)=64:F(2)=32:F(3)=16:F(4)=8:F(5)=4:F(6)=2:F(7)=1
1060 PRINT"INITIALISING": S=32768: T=5120
1070 FOR I=0TO255*8+7:POKE I+T,PEEK(I+S):NEXT: PRINTCHR$(147)
2000 REM PLACE YOUR FORMULA ETC. HERE GIVING X&Y CO-ORDS
2001 REM GOSUB 8000 TO PLOT POINT EG.
2005 FOR X=1 TO 176:Y=45+40*LOG(X/10):GOSUB 8000:NEXT: END
8000 REM PLOT SUBROUTINE
8010 X%=X/8:Y%=Y/8:P=X%+Y%*22+7680
8020 Q=PEEK(P): IF Q>=33 THEN 8050
8030 CN=CN+1:S=5120+(32+CN)*8:T=5120+Q*8
8040 FOR I=0TO7: POKE S+I,PEEK(T+I):NEXT
8045 Q=32+CN:POKEP,Q
8050 C=5120+Q*8+(Y AND7)
8055 POKE C,PEEK(C) OR F(X AND7)
8060 RETURN
```

. . . a sinister plot?

How do we do this on our Vic? Remember you can produce your own characters. Well, hi-res (saves a bit of typing) uses the same principles.

The screen would have to be filled with a different character for each character space. Unfortunately because we have only 256 characters, normal 8x8 grid characters would only fill half of the screen. An easy answer to this is to use double height 8x16 characters.

A more serious problem for people like me who have unexpanded Vics is that a screen full of 8x16 characters takes up almost 4K (about four thousand characters) of memory, and the standard Vic has only 3.5K.

By now you are probably saying to yourself that hi-res graphics are unobtainable on an unexpanded Vic and you have to save up £35 for the Super-Expander cartridge. You can lock up your wallet now once I tell you that baby Vic can do it.

All we have to do is avoid having a lot of characters: or use a smaller screen size. What this means is that our pictures will not be quite as accurate, but there is a way to avoid this (there always is!)

This is how it works. From X and Y co-ordinates Vic works out which character space on the 22x23 screen your dot will be positioned in. Then Vic checks to see if there are any more dots in the defined character. If no dots exist here, Vic places a new character in the grid position and the dot is lit in the appropriate place in the 8x8 character grid.

If dots already exist in this character space the dot is added to this character.

This method offers the advantage of being very conservative with memory. Unlike other routines (or other computers?) the picture or graph only digests the amount of memory required for that particular screen.

To achieve this we need to sacrifice a little speed. Because this routine would be slow anyway (written in Basic) I think we could withstand it (at least until we've saved up £35.)

The actual routine I've been talking about is DEMO 1. It gives the user access to a resolution of 184 x 176 points, though because of the lack of memory only about half this number of points can be lit at any one time.

You'll notice that it is in two parts; Initialisation and a Plotting subroutine. The Initialisation *must* be placed at the start of the program; the plotting is called by a GOSUB after specifying the x and y co-ordinates.

DEMO 2 utilises the DEMO 1 routine to plot a formula entered by the user. The program has been optimised for speed by using variables throughout and the plotting subroutine has been placed at the start of the program. By using the advantages of the keyboard buffer, line 2010 can be changed even when the program seems to be still running.

This is how it works. Your formula is assigned to A$ in line 1000. Then the program prints up '2010 = (your formula) & RUN 1040' and homes the cursor.

Here's the special bit: location 198 contains the numbers of characters in the keyboard buffer. Vic is told there are two in 1030. Location 631 is the start of the keyboard buffer. Two carriage returns are POKEd into the buffer and the program ends.

Now, every time Vic reaches an 'END' statement the contents of the buffer are emptied; so at this point Vic prints two carriage returns from the top of the screen. The first 'return' enters line 2010 and the second executes 'RUN 1040'; this causes Vic to continue the program.

Next month, the secrets of Multi-colour graphics. Pleasant plotting!

Description of DEMO 1

Line 1005: Clear screen: set character colour to black: set screen to purple and border to yellow.
Line 1020: Check character location pointer to see if graphics are already initialised.
Line 1030: Change character location pointer to address 5120.
Line 1040: Reserve memory for graphics.
Line 1050: Bit values to define character.
Line 1070: Copy characters from "character generator ROM".
Line 2005: Example graph.
Line 8010: Work out position of point to nearest (22x23) character on screen.
Line 8020: Checks for any other dots in area of point to be set.
Line 8030: Number of characters used incremented: position of character in character memory.
Line 8040: Clears character
Line 8045: POKEs new character on to screen.
Line 8050: Position of dot in character.
Line 8055: Sets dot.
Line 8060: Returns from plot subroutine.

```
1 PRINT"■":GOTO900
10 X%=X/E:Y%=Y/E:P=X%+Y%*K+J:Q=PEEK(P):IFQ>=F+1THEN30
20 CN=CN+G:S=D+(F+CN)*E:T=D+Q*E:FORI=0TO7:POKES+I,PEEK(T+I):NEXT:Q=F+CN:POKEP,Q
30 C=D+Q*E+(YANDL):POKEC,PEEK(C)OR(XANDL):RETURN
900 PRINT"■CHANGE FORMULA Y/N?":GETA$:IFA$<>"Y"ANDA$<>"N"THEN900
910 IFA$="N"THEN1040
1000 PRINT"■FORMULA =":INPUTA$:PRINT"■■■2010 Y="A$
1030 PRINT"RUN 1040■":POKE198,2:POKE631,13:POKE632,13:END
1040 PRINT"■■":POKE36879,79:IFPEEK(36869)=253THEN1050
1041 POKE36869,253:POKE36867,PEEK(36867)OR128:POKE55,0:POKE56,28:POKE51,0:POKE52
,20:CLR
1042 S=32768:T=5120:PRINT"■ INITIALISING":FORI=0TO255*8+7:POKEI+T,PEEK(I+S):NEXT
:PRINT"■"
1050 DIMF(8):F(8)=0:F(0)=128:F(1)=64:F(2)=32:F(3)=16:F(4)=8:F(5)=4:F(6)=2:F(7)=1
:D=5120
1051 E=8:F=32:G=1:H=128:K=22:J=7680:L=7
2000 FORX=1TO175
2010 Y=85+80*SIN(X/10)
2020 GOSUB10:NEXT:FORI=1TO10000:NEXT
```

Demo 2

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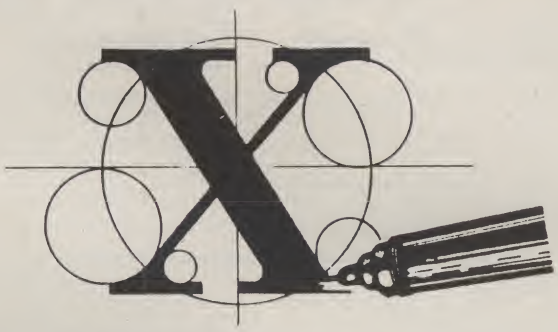

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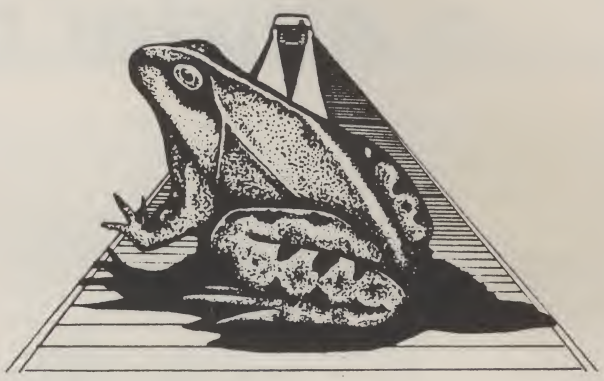

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VISA

Vic Assemblers compared

by David Bolton

Most programs for the Vic are written in Basic. But many users will be aware that it is possible to program the computer in machine code — which is many times faster. Most of the arcade games like Invaders and Missile Command are written in machine code because Basic is too slow.

Programming machine code is a task that has to be done very precisely. One bug can easily crash the Vic or wipe the program from memory. Now, small programs can be written and tested fairly simply on the Vic; but once you get into medium to large size machine-code programs it is very difficult to procede without the use of an assembler. David Bolton reviews assembler packages here.

Machine code just consists of numbers like 76 40 04; humans have difficulty in perceiving these as instructions and working with them. It is easier to think of them as the instruction JMP 1064. The function of an assembler is to make machine-code programming as convenient as possible by converting the instructions (like JMP) into numbers.

It is usual to give names to numbers (like variable names in Basic) and these are called labels. So a sequence like...

```
RESTART = 1064
JMP RESTART
```

...will produce the same machine code as JMP 1064.

But as you can imagine an assembler can be a fairly complicated piece of software to produce. Until recently there have been no assemblers for the Vic. Most of the arcade games produced for the Vic were actually done on Pets using the Commodore Assembly Language system. Now there are three assemblers — with possibly more to appear.

The three I'll be looking at are **The Dr. Watson series: Beginners Assembly Language Programming** by Dr. P. Holmes (a Senior lecturer at Middlesex Poly): Commodore's machine code monitor **Vicmon:** and **Mikro** - which is produced by Supersoft and sold by Audiogenic.

There is a world of difference between them: for a start, Dr. Holmes' book is a teaching device. Mikro is intended for medium to large program production but includes sufficient 'extras' to entice even a complete beginner. Vicmon includes an ASSEMBLE command but is really a complete machine-code debugging tool.

Dr. Watson's Assembly Language Programming

Despite the profusion of 6502-based microcomputers (Pet, Vic, Atari, BBC, Atom, Apple, Oric, UK101, and quite a few more) there have been very few beginners textbooks on programming in 6502 assembly language (the best two are **6502 Assembly Language Programming** by Leventhal and **Programming the 6502** by Zaks).

But those (American) books are far surpassed by **Dr. Watson** (all British!). Holmes' book is aimed at someone who knows how to program Vic in Basic but who is a complete beginner at machine code; starting with the simplest concepts, it progresses all the way up to manipulation and use of floating point numbers by far the most complex subject.

Two assemblers are included as listings or as extra-cost options (on tape) and are used throughout the book to let you learn machine code by doing examples. One is for the 3.5K Vic, the second has more advanced features and needs 6.5K: Both will work with larger memory expansions.

I should stress at this point that both assemblers are for teaching purposes only and could not easily be used for producing large programs. The source code (the instructions like JMP) is assembled into machine code as it is typed in, and cannot be edited.

The book however is generally good. There is only one main criticism that I have of the text and assemblers: the use of non-standard 6502 mnemonics. This has been done to simplify the assemblers, but it means that anyone starting in this way will have to relearn a new set — and that is no mean task.

For instance, LDAIM 1 is used in the book instead of the standard 6502 mnemonic LDA £1, STAX 7679 instead of STA 7679,X.

The book does provide a full teaching course with numerous examples and a series of exercises. Also included are binary and hexadecimal equivalents and lessons to test how much you have learnt.

Assembler 1 (for 3.5K Vics) has three commands: ENTER, LIST and RUN. LIST provides a simple dissasembler which can also be used to look at the Vic's ROM as well as your programs.

The larger assembler introduces a greater level of sophistication — labels for both variable names and addresses, and macros which allow easy duplication of routines.

There is also a built-in monitor which works just like that on the Pet letting you alter, save and run machine code.

As with the 3.5K assembler, programs can only be changed by retyping the relevant lines: this is all right for overwriting, but deletions and insertions cannot be done.

Commodore's Vicmon

Although this is not really an assembler I've included this cartridge in the review as it does have an ASSEMBLE command.

An MC monitor (*not* a television monitor!) is a piece of software which lets you enter, run and debug machine code programs: some Pets come with a built in monitor called TIM (which we will see more of in the Mikro review).

There is quite a fine distinction between assemblers and machine code monitors. An assembler does just one thing — it converts programs written in assembly language (the mnemonics like JMP and RTS) into the numbers that the 6502 can understand. An MC monitor can then be used to debug these numbers.

Vicmon is exceptional in that it provides an ASSEMBLE facility. Most monitors only *disassemble* machine code (in other words, list the numbers as instructions) which is a much simpler task.

Starting up Vicmon

Vicmon comes as a cartridge which must be plugged into the expansion port or on an expansion board. It is resident at address $6000 (24576 in decimal): so the maximum RAM it will run with is 20K, if you have an expanded system.

It does not run at switch-on — you have to type SYS 24576 to get into it. When this is done you get a display of registers and a full stop (.) indicating that it awaits your command.

There are 19 commands that it understands — each a single letter of the alphabet, like **A** for 'assemble' and **G** for 'go'. These can be divided into several groups according to their function.

- **Input and output: L** and **S** allow you to **load** and **save** machine code to tape or disk.
- **Hosuekeeping: E** and **X** permit Basic programs to co-exist with machine code. As soon as Vicmon is started the E command must be given together with an address where the first 256 bytes of RAM can be stored. These contain information about Basic programs and must be saved or any Basic programs will be lost.

The X command exits to Basic: and if an E was given earlier, it will restore the 256 bytes.

- **Memory alteration: F** fills a block of bytes with any value (0 to 255). **M** shows the **contents of memory** in blocks of five hexadecimal values per line. The cursor can be moved over these and new values entered.

The **R** command is similar to M, except that **registers** are shown (A,X,Y...) instead of RAM. Changes are again done by the screen editor.

N and **T** are used together. T moves blocks of bytes to new locations: and N can then 'renumber' any JMP, JSR or absolute instructions to suit the new address — a very important command if you want to move any parts of programs around.

For instance a chunk of program might have five JSRs (the machine-code equivalent of GOSUB) to address 2356. If we have to move the subroutine, perhaps to fit in a couple of extra bytes, then all the JSR 2356s will have to become JSR 2358.

- **Display instructions: D** provides a **disassembly** of any machine code back into assembler mnemonics. For instance, 160 240 will be shown as LDY £240. Most monitors have this command.

Many machine code programs will have some messages or prompts: the **I** command lets you look for these in RAM and shows them in character form. All special colour changing, cursor-moving, and codes like 147 (clear screen) are ignored and shown as full stops.

H is the equivalent of the Toolkits' FIND and gives the location of any bytes or messages that you wish. It searches through 8K in a couple of seconds. You have to get the sequence you are looking for exactly right or it won't find it; if located, the address is displayed on the screen.

- **Machine-code execution commands:** this group consists of some very powerful commands which allow you to trace and single-step machine code programs.

B and **RB** set or reset a **breakpoint.** A breakpoint is a location at which the program will stop if it ever gets there. As the 6502A in the Vic executes roughly 330,000 instructions a second, this can be a very useful feature. In addition a counter can be set at a breakpoint so that it will only execute 20 times say then stop at the 21st.

G starts a program **running** (just like SYS in Basic). It will return to Vicmon if it hits a BRK instruction (value 0) or to Basic if it finds RTS (value 96).

The **single-step** mode is provided by **W** (for **walk).** This executes just one instruction at a time, then waits for you to hit a key. It then lets you either display the contents of registers, stop altogether or carry on. If a particular piece of code is not running correctly, you can trace it with W and discover just where it is failing.

Along with W goes **J**, a **jump to subroutine** command. If a subroutine is called while you are single-stepping, you can have it execute in one go by hitting J. This is of particular use if your program makes use of system routines.

To speed things up as well, **Q** does a **fast 'walk'** without needing a keypress after each instruction. It does check for the stop key so you will not get hung up needing RUN/STOP and RESTORE to break out.

I've left until last the **A** (for **assemble)** instruction. This puts you into assemble mode and converts every assembly instruction entered into machine code. It isn't a full assembler: you can't enter FRED = $6000 and then JSR FRED. But it does calculate branches, which is very useful.

If you want to acquire some machine-code experience then I would recommend Vicmon as being very helpful. It isn't the cheapest way (about £35). But if you've a friend with a copy, then try it out. Especially try out the D,T,N and S commands between $6000 and $7000 and look at how it was written.

Mikro

Mikro I've saved until last as it is the cream of the pack. (I was going to say that it's the only 6502 assembler for the Vic, but Stack have just brought out Vickit 5 which also qualifies — we'll try for a review copy).

To anyone with Pet experience, Mikro should be a familiar name: Supersoft had a version out for that micro a couple of years ago. The version for the Vic also includes a lot of extra toolkit, graphic and sound commands. The whole package is sold as a plug-in cartridge by Audiogenic.

Mikro consists of four sets of extensions.

- full 6502 assembler
- programming aid commands
- graphics commands
- sound and joystick/paddle/ lightpen commands.

All of these extend Basic: and unlike Vicmon you are always at Basic command level.

The 6502 assembler is similar in concept to that in the BBC micro. Your assembler mnemonics are entered as single lines of Basic and can be altered with the screen editor.

Here is a sample program to put an ampersand in the top half of the screen:

```
10 * = 828
20 SCREEN = 7680
25 COLOUR = 38400
30 LDA £0
40 TAX
50 LOOP STA SCREEN,X
60 STA COLOUR,X
70 INX
80 BNE LOOP
90 RTS
```

There are a few small points to watch for. The program must consist of assembler instructions — no Basic statements. Spaces have to be carefully watched for: and must come between labels and statements like LOOP STA, but not between = and 7680.

Once the source code (as assembly code is usually called) has been entered and saved, it can be assembled into object code (as machine code from a compiler or assembler is known). This is done by typing ASSEMBLE, or a shorter version using shifted E.

If the assembly works, you can start the program running by SYS. Any problems from here on can be dealt with by Vicmon. It is always a wise precaution to save your program before trying it as machine code is much less forgiving than Basic.

As assemblers go, Mikro is pretty typical. Numbers can be specified in decimal, binary, octal or character form. For instance $41, %01000001, @122, and 'A' are all the decimal value 65. Labels are provided; so FRED = 65 can be used, and all references to FRED will give the value 65.

The **LINE** and **LINETO** commands must be preceded by a **PLOT, ERASE** or **FLIP** and carry out that function between **x1,y1** and **x2,y2** in colour **c** (if appropriate). The **TO** command uses the last plotted point to start from, and several TOs can be strung together.

PLOT LINE 1,1,50,1,0 TO 50,50 TO 1,50 TO 1,1 will draw the outline of a box in colour 0 (black). The colour parameter is optional in most commands and uses the last value set if omitted.

TEXT and **OVER** are two very clever commands: they permit text to be put anywhere on the screen, although you have to be careful when you are near the edge. Printing text this way is slower than usual, but it does include the ability to draw any Vic block graphic symbol. Numbers and string variables can also be printed with cursor movements and colour changes.

We still have one last set of commands. These provide easy access to sound, joysticks, paddles and lightpens.

SOUND voice, pitch	**voice is 0 to 3, pitch 0 to 128**
VOLUME level	**level is 0 to 15**
PADDLE (x)	**x is 0 or 1 for two paddles**
JOY (x)	**(see below)**
PENH, PENV	**horizontal and vertical position of light pen.**

The **JOY** command includes a parameter X which is ANDed with the joystick value giving easy identification of direction. It sounds complicated, but isn't too bad in practice. For instance, JOY(12) will only allow values of 0,4 and 8 which indicate the joystick is centre, left or right. The fire button adds 128: so JOY(140) is needed to detect movement and firing.

Best buy?

Dr Watson, Vicmon and Mikro are three different pieces of software that between them cover the whole area of machine code programming. All three have excellent documentation — particularly Dr Watson; I think a little more could have been given with Mikro.

It is very difficult to compare the three: it's a question of horses for courses. For the complete beginner I would have no hesitation in recommending Dr Watson. If you've a little knowledge of 6502 programming then Vicmon will come in very handy for consolidating what you know. Mikro is undoubtedly in a class of its own and well worth getting if you are going to write a lot of machine code programs.

Where to find them

- **Dr Watson Beginners Assembly Language Programming** ...book and cassette, published by Honeyfold Software: available from some dealers, or by post £14.95.
- **Vicmon** ...cartridge from Commodore: available from dealers. Price £34.95.
- **Mikro** ...cartridge from Audiogenic: available from several dealers and retail outlets, or by post £48.95.

→

Four extra pseudo-ops are included: **TXT, BYT, WOR** and **END**. The first three provide a convenient means of setting up tables of text, bytes or words (two-byte values like 7680). END is optional and tells the assembler it has finished.

These programming aid commands are provided:

DISASSEMBLE	**list object code as instructions**
NUMBER	**convert between bases**
FORMAT	**list source code neatly**
TIM	**tiny monitor (identical to Pet version)**
AUTO	**used for entering programs**
DELETE	**deletes blocks of program**
FIND	**locates any characters or words**

Of these the last three will be of most use — they work equally well with Basic programs and source code (although you can't mix the two).

TIM is a Tiny Monitor with commands identical to the version provided in some Pets. It has six commands to let you load, save, alter memory and registers and run machine code. There is none of the sophistication of Vicmon apart from using the screen editor to change values.

FORMAT is useful as it lets you enter source code in any format and it will then display it neatly lined up with indentations and colour changes. it does not alter the code, but it does highlight any mistakes before the assembler finds them. It's a command I never made much use of, though I can see it would be very handy with a printer.

Interfacing machine code with Basic

Locations 780 to 783 store temporary values of the 6502 registers whenever a SYS is done. If values are poked into these addresses, they will be loaded into the 6502 when the SYS starts and are returned there when it finishes.

Mikro provides a simpler way of setting up the registers by the **PARMS** command. PARMS 10,20,30,0 will set up A,X,Y and ST with the respective values when SYS is done.

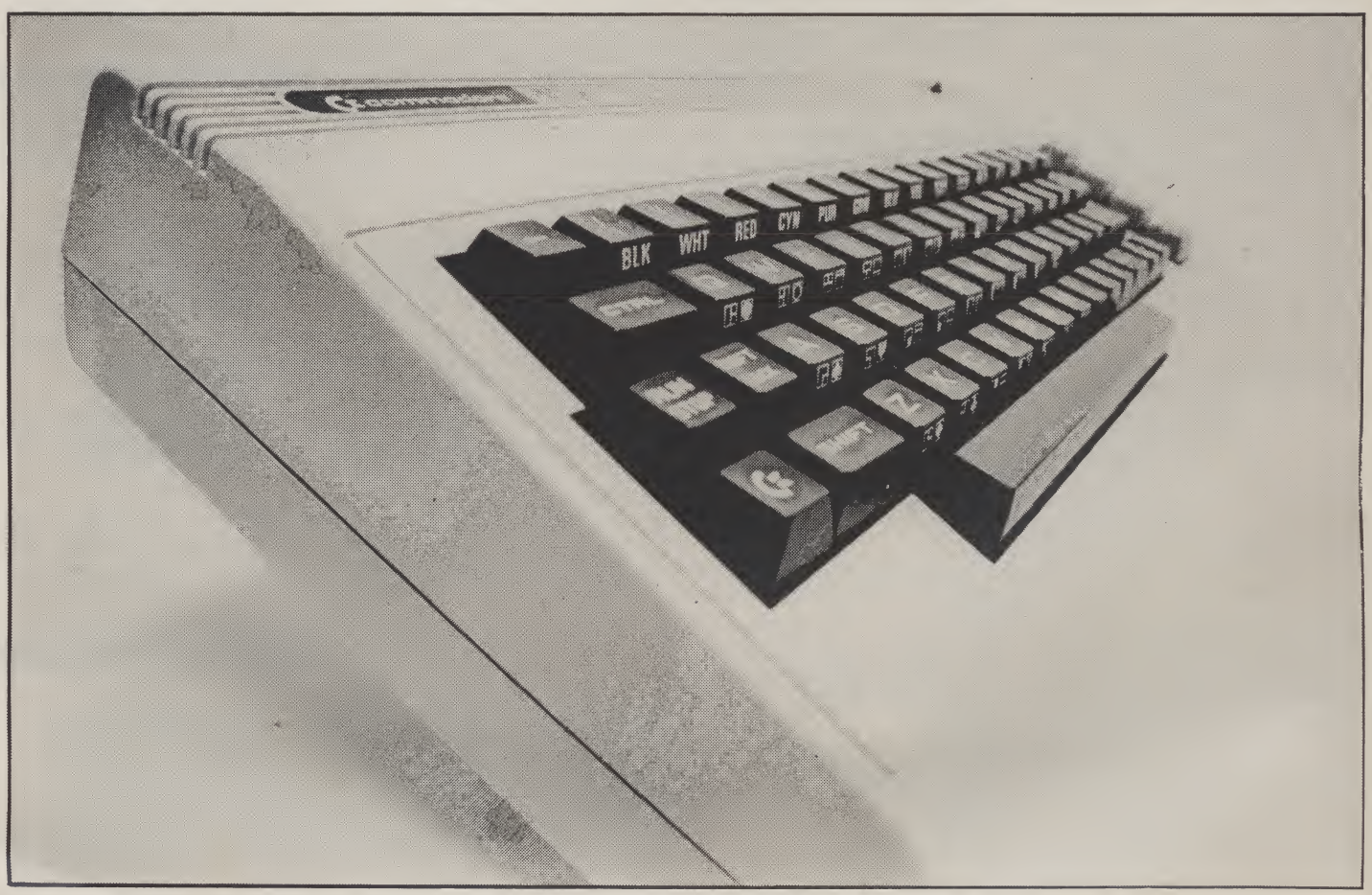
These values can be retrieved by the ACCU, XREG, YREG and STREG variables as in **LET A = 4 + ACCU*256**. These do not interfere with AC, XR, YR or ST as they are not normal variables.

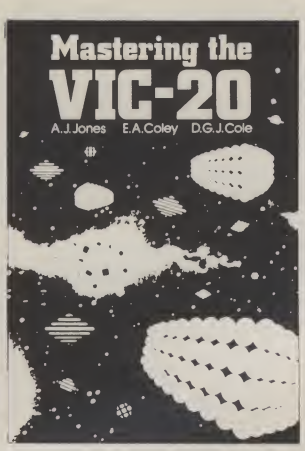
A technical look at Mikro

The review cartridge that I was supplied with had no opening screws so I had to deduce the contents by much peeking and disassembling. Mikro has a lot inside: as far as I can tell there's about 16K of ROM (in two 8K blocks, $6000-$7FFF and $A000-$BFFF) and 3K of RAM (at $0400 or 1024-4096).

The RAM provides the ability to use the hi-res graphics and some twelve commands make this a fairly simple task. There are no circles or triangle plotting, just line and text.

SETPLOT	**turn on Hi-res screen.**
CLEAR	**return to normal screen.**
VDU border, screen	**set border and screen colour.**
PLOT x,y,c	**plot point at x,y in colour c.**
ERTASE x,y,c	**remove point at x,y.**
FLIP x,y,c	**plot or remove point.**
LINE x1,y1,x2,y2,c	**see below.**
LINETO x,y,c	**see below.**
TEXT @x,y,c, 'text'	**print on hi-res screen.**
OVER @x,y,c, 'text'	**over print text.**
PLOT (x,y)	**returns if point plotted.**
COLOUR (x,y)	**returns colour at point.**





Mastering the VIC-20™

by **A.J. Jones,** *Department of Mathematics, Royal Holloway College, University of London;* **E.A. Coley,** *Senior Microcomputer Sales Engineer, Dynaland Limited, Reading,* and **D.G.J. Cole,** *Microprocessor Applications Engineer, Pro-Bel Limited, Reading.*

This book is a machine-specific introduction to microcomputers based on the VIC-20, designed to supplement the booklet provided with the machine. It offers a wealth of interesting programs which can be supplied separately on tape or disk, or entered by the reader.
After a comprehensive study of BASIC and VIC-20 structure, the reader is introduced to machine code programming using the VICMON assembler. A unique feature is the quality and quantity of programs contained in the book, which are used to illustrate classic problems arising in programming, and show how solutions can emerge quite naturally.
Several of the longer programs are commercial in their own right. These include MINISYN, setting up the VIC as a two-octave keyboard instrument with sustain and colour display; PONTOON, an excellent card game used to illustrate shuffle routines, card displays and program logic; and STARSHIP, a classic *Star Trek* game, which will be particularly popular and appealing. There are also innumerable tables and diagrams.
Hi-resolution graphics in BASIC and Machine Code are explained in detail. Routines for saving a Hi-resolution screen to disk or tape are given, together with a BASIC program which will output a Hi-resolution screen to the VIC-1515 printer.
Other features include: detailed discussion on various VIC peripherals, e.g. cassette, disk drive, and printer, together with sample programs on Sequential Files for cassette and disk drive.

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0 85312 585 6 **178pp** **March'83** **(paper only) $11.95/£5.95**

Published by Ellis Horwood Ltd., Chichester, and marketed by John Wiley & Sons Ltd.

The VIC-20™ for children

by **A.D.J. Noble**

The VIC 20 computer from Commodore is one of the first in the new line of CBM computers and is now being widely and successfully marketed by a number of major "high-street" stores.
It is aimed at the younger user, perhaps working with their parents to explore what computing is all about. Now that microcomputers are finding their way into schools, parents should also find that this book — with a VIC 20 — will also provide valuable out of school education. After all, a class of 30 with one computer gives little chance for hands on usage, but this book can solve the problem: everything from switching on the VIC 20, through simple BASIC programming to exciting games and puzzles. It also provides a new, fun way of learning arithmetic and other subjects. The programs are thoroughly tested and presented attractively for young readers.

Contents: WHAT'S IN THE FUTURE? An Introduction for the Reader — Especially the Parent — To See Why Computing is Important as a Skill, and Why It is necessary to Come to Terms with Microcomputers: YOUR QUESTIONS ANSWERED: This Explains the Main Features of a Computer Like the VIC-20 and what 'Programming' Is All About: WRITING AND DESIGNING PROGRAMS: Program Design and Flowcharts: SIMULATIONS: Explore the Colour and Sound Features of Your VIC 20 with Adventure-style Simulations of Real Life. Find Out How to Write Your Own Adventure Programs and Use Two Ready-made Games: Smugglers and Saurus Island. These Encourage Thinking Strategies and They Are FUN!: DEVELOPING YOUR STYLE: Hints and Tips for the Programmer — Save Time and Trouble and Plan Your Programs Logically: THIRTY PRACTICAL PROGRAMMING STEPS: A Highlight of the Book — If You Read Nothing Else — Read This! It Takes a Novice from Switching On, Through Text, Graphics Colour, Music to PEEKs and POKEs. This Makes Anybody into a Programmer: PROGRAM LISTINGS: All Guaranteed to Work on the Smallest VIC 20: Programs Include: Select Vowel Sounds; Early Words; Area Concept; Mathematical Practice; Code Breaking; Launch a Rocket (Table Practice).

0 905104 25 0 **156pp** **Feb'83** **(paper only) $10.60/£5.95**

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The 64 Pages

Using the 64 with a 1540: Because of timing differences between the Vic-20 and the 64, the 1540 disk drive does not work normally with the Commodore 64.

There are two solutions to the problem. First, the disk drive ROM (part no. 325303-01) can be replaced with a new ROM, 901229-02. This new chip allows normal operation of the disk drive: your dealer should be able to get one from Commodore's Service Department.

Alternatively, the screen can be switched off before each drive access and switched back on again afterwards. This can be done with two pokes; POKE 53265,11 to switch off the screen and POKE 53265,2 to switch it back on again.

... **And some cassette curiosities:** When using the C2N cassette with the 64, you'll have to get used to some funnies. Whenever any cassette activity is taking place, the screen of the monitor will go totally blank. And when loading from cassette, the screen again goes blank; then the found message is displayed, and after a pause the screen will blank again while the program is loaded. As Commodore's note to dealers ruefully puts it, this "is likely to cause user problems; all sales staff handling the product should be aware of it".

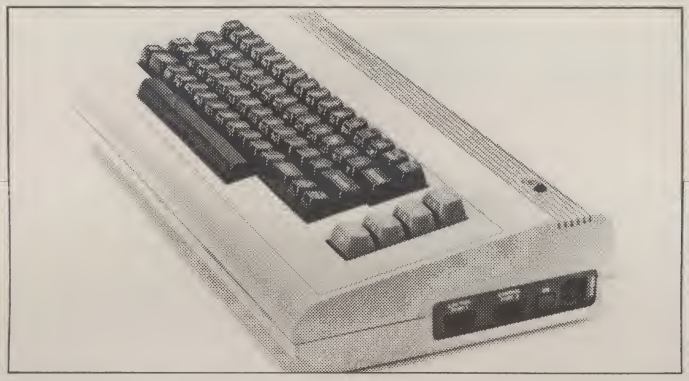
... **And the printer too:** We hear that "under certain conditions", particularly when printing long lines, the 1515 printer may hang up at the beginning of a new line.

This can be overcome by switching the screen off before the start of the printer routine with POKE 53265,11 and switching it back on with POKE 53265,27 when you've finished. Fun, huh? This idiosyncracy does not seem to occur when doing a listing, as it happens.

Free space: If you're using Basic on the 64 you have 38911 bytes at the start. Unfortunately, the logic for FRE(0) translates the answer as an integer using integer logic; the largest number it knows is 32767. If you have a small program (less than 7K), FRE(0) gives a negative answer. How do you discover how much memory is available? You work out 64K plus FRE(0).

You read it here first: As forecast by us, Commodore has announced a really good-looking four-colour printer-plotter for the Vic and the 64. It's cheap, too — $199. The bad news is that it's only available in the States as yet.

Also announced there is the wide version of the 1515 printer. Under the name 1525, it prints text and graphics at 30 cps on sprocketed stationery or single sheets: it retails for $395.



Audiogenic's 64 bundle

Audiogenic reckons it already has "the largest and best-quality range of software for the Vic-20", so it's hardly a surprise that the company wants a share of the 64 action. It has released a comprehensive range of software for the Commodore 64 under the label 'SOFTWARE 64' — a product line unique to Audiogenic. The software is available direct from Audiogenic or via the nationwide Commodore dealer network and some major retail chains.

Motor Mania is described as "a thrilling cross-country car race game" in which the player has to avoid hazards (broken glass, potholes, avalanches, logs, other traffic) while covering motorways, B-roads an dirt tracks: the screen displays full dashboard instrument readings. Motor Mania sounds like a powerful demonstration of the Sprite graphics capabilities of the 64. It's on cassette at £8.95.

Renaissance is a cassette version of a best-selling Vic cartridge; it's a state-of-the-art of the Othello board game with nine levels of play. It costs £8.95.

Grandmaster is one of the better (incidentally, we're trying to set up a Vic/64 chess package challenge to check out all such claims). Grandmaster claims to be the strongest chess game for home microcomputers; facilities include 10 levels of play, automatic queening, castling and en passant, and automatic self play. It can also be forced to take the move that it is considering at any time to introduce 'human' errors. Supplied on cassette, Grandmaster costs £17.95.

FORTH was written by Dave Middleton, one of the language's aficionados. Forth is a powerful little language that could appeal to those frustrated with the limitations of Basic but who are not yet ready for assembly language. Forth includes provision for user-defined commands, which is one of its main strengths. (We have just commissioned a series on Forth to let you know more.)

Audiogenic's 64 Monitor is a variant on the machine code programmer we've reviewed for the Vic. It contains standard TIM commands and has a built-in Centronics interface, allowing the 64 to use many of the better printers available.

The 64 version of the best-selling **Wordcraft** word processing program (our favourite for the Vic-20) is also on offer. Featuring all the facilities of Wordcraft, Wordcraft 64 is supplied with "a comprehensive user manual" says Audiogenic: hope it's better than the Vic manual!

WP by Kobra

A "very special" word processing package for the 64 has been launched by Kobra Micro Marketing, a company which seems keen to have a lot of 64 software very soon.

Paperclip provides WP features that Kobra claims are unusual on a price of £86. Naturally you get facilities such as text revision, merging, and formatting. But PaperClip also has some quite advanced elements, too — like column sorting, whereby columns of data may be sorted within a document: some mathematical features like automatic addition for invoices, quotations, and discounts: and up to five simultaneous 'search and replace' operations "with added query feature" (whatever that is).

For completed work there's a Pre-print screen preview; and the printing can include subscripts, superscripts and bold print.

Sounds good. We've asked for a review copy.

Multi-user 64

Kobra Micro Marketing the pride of Henley-on-Thames, has announced what looks like a low-cost method of setting up a multi-user Commodore 64 system. It also works with Vics, too, but the 64 is the main target.

The 64 Switch enables up to eight 64s to share one disk drive, giving each user entry to stored data files. Additional Switches can be interconnected for even larger networks.

In operation the 64 Switch scans each of the connected 64s at regular intervals, asking whether it wants access to a peripheral (doesn't have to be a disk). When this is required, 64 Switch gives the machine in question access to the IEEE bus and the search for an active 64 is restarted when the 64 in control has not used the bus for approximately 0.5 seconds.

64 Switch is only available direct from Kobra at the moment. Typical prices quoted are £95 for a two-user system, with an eight-machine Switch at £117.00 (excluding VAT, naturally). Kobra is at Farm Road, Henley-on-Thames.

Instant voices

Elsewhere in this issue you'll find Chris Durham's review of Vic voice devices. He mentioned that the 64 would be getting a Commodore speech synthesis add-on. Well, hot from the presses the news has arrived.

The voice synthesizer (for the Commodore 64 only) is the first voice I/O product to be developed at the company's Speech Technology Division in Dallas, Texas. It is capable of generating a wide variety of voices "including female and children's voices" for "games and learning cartridges", and will be usable from Basic.

It looks as though the commands are really simple. Here's the sample we were told about:

```
10 SAY "ENTER YOUR NAME"
20 INPUT B$
30 SAY "THANK YOU"
```

Besides that, there's a built-in 'learning activity' called "A Bee C's" — an instructional program that uses speech to teach the alphabet to pre-school children.

The exciting feature is the potential to integrate voice into games and learning cartridges as standard: Commodore says it is now developing cartridges" that will offer the widest variety of exciting games and instructional material for home use", and the synthesizer's cap ability to accept different vocabularies and different voices means 64 computer owners will be able to choose the type of voice used with various programs.

The cleverness is apparently achieved by 'stealing' processor cycles — a special technique which allows speech to be generated while the computer's microprocessor is performing other functions, such as graphics or cartoon animation.

The advance info says that there are three modes of operation, two of which you get with the basic module; the third requires the purchase of extra cartridges.

And when do we see it? Well, the States gets it about now — price "under $100". We should have it in the Summer.

Our review of speech devices includes one called the Chatterbox from Hales. It originally hailed (ho ho) from Currah Computor Components of Hartlepool; the situation for that company's products has now become clearer with the news that Currah has reached agreements on nationwide marketing of its computer accessories.

The deal means that a company called Adman Electronics will act as manufacturer for the Currah-devised voice synthesiser and a motherboard, while Hales Ltd have UK, European and Japanese marketing rights.

Currah will now be concentrating on research, design and development of further computer accessories "secure in the knowledge that we have the best means possible to exploit new ideas".

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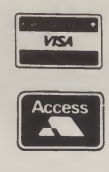

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Random Thoughts

by Mike Todd

For anyone writing games or simulations, the Vic's random number generator is of immense value. It generates a random number between 0 and 1 and is easily accessed using the RND function.

Like nearly all personal computers, the number generated is not a true random number but a 'pseudo' random number — which is part of a sequence of numbers that will eventually repeat. This sequence is designed not to repeat for a very long time, though: to all intents and purposes the numbers are random.

So how does it work?

Well, we start with a 'seed'. This is usually the last random number generated; but it could be any number, as we'll see later.

This is first multiplied by 11879546.4 and then added to 3.92767778 E-08. The resulting floating point number occupies five bytes; four of these are then swapped around and the resulting number is turned into a positive fraction — this is our random number.

Whenever RND(1) is called, the last random number is used as a seed to generate the next in the series: and the new number is saved as the seed for the next. This continues every time RND(1) is called. (Although I'm using RND(1) as the example, any positive number can be used with the same effect.)

From this it shokld be clear that if the Vic was to generate a random number that was the same as the initial seed the sequence would repeat from that point onwards. I've set the Vic generating over a million random numbers and never had this happen!

When the Vic is switched on, there is no previous random number. So a seed value of 0.811635157 is set up. Obviously this means that the sequence of random numbers always starts with the same seed and so the sequence will always be the same.

A game which uses RND(1) would therefore operate the same way every time it is loaded and run immediately after the Vic has been turned on.

Some other personal computers recognise this problem and provide a RANDOMISE command. This generates a truly random starting seed. Although the command doesn't exist on the Vic, there are several ways of implementing it.

If we use RND(-X) instead of RND(1), X then becomes the new seed and further uses of RND(1) will continue from this seed. This gives a simple way of starting the series at random — we can use RND(-TI) at the start of the program. Since TI is reasonably unpredictable, the result will be random: and the following sequence of random numbers will be as random as you would want.

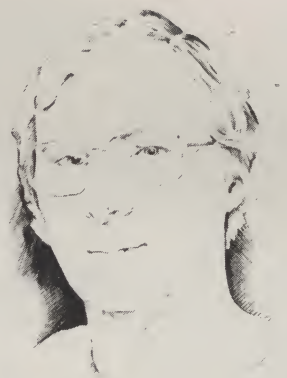
Random numbers in a program can make debugging difficult, so the same feature can be used to force all random numbers in a program to follow the same pattern every time the program is run. Simply start the program with RND(– 1), and this will seed the series with the number 1. If you want to try a different series, change the negative number; and when you want to run the program properly just alter it to – TI.

There is an even better way of generating this initial seed, and that is to use RND(0). If the number in brackets is zero, the Vic fetches values constantly-changing four locations within the interface chips and uses them as the seed. These are even more random than TI and provide an even better way of shaking up the series. So instead of RND(– TI) use RND(0) at the start.

These randomising techniques should only be used at the *start* of program as it is at this point, after an indefinite wait, that the timers and locations are at their most 'random'. If you do want to give the series a bit of a kick in the middle of a program, do it after something which takes an undefined length of time such as in INPUT command.

If you're adapting a program written for another machine, you may find something like RND(6) appearing. This is because some machines will generate numbers from zero up to the number specified.

This feature doesn't exist on the Vic; but if you need an integer between 0-Y, use **INT(RND(1)*(Y + 1))**. And if you need one between X-Y, use **INT(RND(1)*Y + X)**.



There will be purists who say that these random numbers are far from random. For specialist applications in scientific or statistical applications I'd have to agree. But for games and most simulations, there is nothing wrong with them at all.

Rounding Errors

One of the major problems with most computers is the fact that numbers have to be represented in binary. For whole numbers, there is no problem — although there may be practical limits to the numbers used. But for fractions there are a whole host of difficulties, all arising from the fact that it is not always possible to represent a fraction in binary accurately.

In our decimal system we are used to errors which arise. For instance, when 1 is divided by 3x the result is 0.3333333...and so on ad infinitum.

There are many fractions which don't convert exactly into a decimal number, and the answer to a sum such as (1/3)*3 could easily end up as 0.99999...were it not for 'rounding', which should compensate at least in part for the lost digits. Thus (1/3)*2 would produce 0.66667; and (1/3)*3 would become 1.00000 simply by adding a rounding fraction to the end of the number.

If we want the result to five decimal places, this would assume that we work to six decimal places and add 0.000005 to the result ignoring the final, sixth, digit. o.666666 would become 0.666671; and ignoring the digits we don't want this becomes 0.66667.

Even so, we still end up with rounding errors in our calculations. In our example, we are actually out by 0.000003333333 recurring — better than 0.0000066666, which it would have been without the rounding.

So it is with binary representations of fractions in the Vic — where most calculations are done with an extra bit, and a rounding factor is added to the results.

For a variety of reasons (including small bugs in the Basic interpreter section written by Microsoft) these errors often show themselves. Although not always significant, they are worth bearing in mind.

Straight decimal fractions (such as 0.5, 0.25, 0.125 and so on) convert very easily to binary. It is however ironic that some of the hardest to represent accurately are also straight decimal fractions — 0.1, 0.001 and so on. As a result, many of the problems associated with rounding errors and conversion error occur when using these fractions.

For instance, try this:

```
PRINT INT(10*0.1);
INT(0.1*10)
```

The answers in both cases should be 1, but in one case it's not! Why?

A bug in the INT function fails to round the result correctly and the intermediate result of 10*0.1 is 0.999999999, the INTeger of which is 0.

Another example is easily seen by typing the following program:

```
10 FOR X = 0 TO 10 STEP 0.1
20 PRINT X
30 NEXT X
```

RUN it. You may be surprised at the result!

The last few steps will be:

```
9.80000001
9.90000001
```

...which in itself may not seem to be a problem. But just imagine you want to do something when X = 9.8 and you have IF X = 9.8 THEN... in the loop. Because of the rounding errors, X will never be 9.8!

The only real answer to this problem is to test for X being within a range of values. Add this line:

```
15 X = X*10/10
```

...and you'll see that things get even worse!

Review: Vic speech output devices

by Chris Durham

Perhaps after reading the article 'Talking Vic' by David Calderwood in the last issue, you thought about the idea of making your own Vic speak. Or maybe you feel that it's time your computer broke out of its strong silent image and started to talk back. Whatever your reasons, speech synthesis devices are now readily available and can change yet another aspect of the way you communicate with your computer.

What are speech synthesisers, what do they cost and how easy are they to use? Chris Durham takes a look at what's available under £100.

There are two common ways of producing speech on the cheap for a computer. The first is called *Linear Predictive Coding*. A weighted sample of an actual word is stored in a ROM; the word is then recreated electronically using the sample as a 'model'.

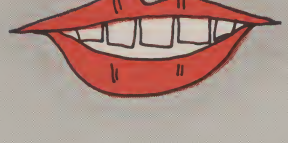
LPC requires between 120 bytes and 250 bytes of storage for each second of speech (up to 12K bytes to store about 50 words). With LPC you are limited to the words stored permanently in the ROM, but the speech which is produced is readily understandable and of a fairly high quality.

The second method is less expensive. It does not store any ready-made words, but instead uses parts of speech called *phonemes*. You build up any word you like from a (fairly limited) number of phonemes; and this reduces the storage requirement to a reasonable 12 to 25 bytes per second of speech. There is no mass storage requirement and you can create any word you choose, without limit.

The snag is that the speech which is produced can sometimes sound rather like a Dalek with a cold. Although the speech is understandable, the lack of intonation and character sometimes makes it difficult to recognise certain words straightaway — until your ears are attuned to the pronounciation. This is particularly true of those systems which do not allow any inflection to be added, or alteration of the pitch.

As with all things, you only get what you pay for; although there *are* LPC systems available for the Vic, they are all above the £100 limit. There are currently four systems being advertised for the Vic which cost less than £100 and they all use the phoneme method of speech synthesis. The cheapest is a kit at £39 and the most expensive comes ready built in a hi-fi type speaker cabinet and costs £89.

Actually it is more correct to say that these systems use *allophones*. A phoneme is a name given to a group of similar sounds in a



language. But the same phoneme, the letter 'R' for example, can be pronounced differently depending on whether it occurs at the beginning, in the middle, or at the end of a word. Each different sounding 'R' is an allophone of the phoneme 'R'.

Hales Speech Synthesiser

This was originally marketed by Currah Computor Components under the names 'Chatterbox' and 'Minah Speech Module'; it was a Chatterbox that I had as a review model. There have been a number of changes in the marketing of this product however; it is now sold as the **Hales Speech Synthesiser** in a smart new package costing £69.95 including VAT).

It consists of a cartridge with an extra lead which piggy-backs on to the monitor output lead. The cartridge plugs into the Vic in the normal way, including any of the motherboards: the lead plugs in between the computer and the normal TV monitor connections — this enables the sound to come through the TV loudspeaker.

The cartridge is active the moment the Vic is switched on, sounding out the keys as they are pressed — 'Ay', 'Bee', 'See' an so on. This is fine initially and useful if you are learning to touch type; but you soon learn how to turn it off as it can drive you up the wall.

Quite apart from ruining the concentration when you are trying to type, the interrupt-driven software in the cartridge slows the keyboard scan considerably. The result is that if you are a half-decent typist the computer only reads two out of every three keys you hit.

You can turn the cartridge off using RUN/STOP and RESTORE, and subsequently reactivate it with a SYS command if needed.

There are two other functions immediately available. If **F1** is pressed once, the cartridge sounds out the keys phonetically — 'Aaah', 'Ber', 'Ker'. Pressing F1 again restores the normal pronounciation.

Pressing **F3** puts the cartridge in 'allophone' mode and it is this facility which really sold this system to me. Instead of looking up a code number for the allophone you want, you type the allophone itself followed by the slash character. The computer immediately pronounces the allophone. You then type the next allophone, but this time when you type the slash it pronounces both of them in order; and so you build up your word.

You can even build up a whole sentence, since you can separate individual words by pauses ranging from 10 to 200 milliseconds. So the string 'H/E/L/OO/' will make the computer say the word 'Hello' immediately you type the final slash. All this without having to write a single line of code!

Talkaway

The major advantage of all this is that you can make up your words as you go along and change them immediately if they do not sound correct. The instruction booklet gives plenty of examples of combinations of allophones to give better pronounciation.

Once you are happy with your string, you can use the wonderful screen editor that Commodore so thoughtfully supplies on their machines to put it in a DATA statement. Indeed, it is so fast to use this method that I had my Vic chattering away within ten minutes of starting to use it.

Because the Hales Speech Synthesiser contains an allophone-to-speech converter built into the cartridge ROM, all the hard work is done for you. You can see what your DATA statement says even though the spelling is phonetic rather than English (as shown in fig.1 — compare this with the program required to operate the Speakeasy in fig.2 to say the word 'Hello'). Fig.1 shows just how easy it is to incorporate speech into an existing program. You can set the string up directly if you wish instead of using DATA statements, but the basic syntax is identical.

It is the SYS41000 call which activates the synthesiser and produces the speech. Line 30 in fig.1 is a dummy statement to select the required string to be spoken. What you are doing in effect is telling the speech ROM where to find the required string, since line 30 puts the memory address of the string into a known location. This statement must immediately proceed the SYS call or it will not work.

You can use string arrays as well, giving a choice of output depending on the value of a variable. The permutations are limited only by your imagination and the size of your computer's memory.

Drawbacks

In case you think that everything about the Hales cartridge seems too good to be true, I did discover one or two minor problems.

The first was that there was no mention in the instruction manual of where to connect the lead that came out of the cartidge. It didn't take too long to work out, but might have caused problems for a beginner. I am happy to report that in keeping with the new marketing policy Hales is rewriting the manual completely and have given an assurance that this and other minor omissions have been rectified.

```
10 FOR A=1 TO 2
20 READ A$
30 A$=A$
40 SYS41000
50 NEXT A: END
100 DATA"H/E/L/OO/P4/DH/I/S/S/P3/I/Z/P3/"
110 DATA"Y/OR/P3/F/I/K/P4/S/P/EE/K/I/NG/"
120 REM P3 & P4 ARE PAUSES
```

Fig 1 - Program for Hales cartridge

The second and more serious problem occurred when I switched on my Vic and pressed a key. The system promptly crashed and went dead. This happened every time I restarted and touched any key. This one took a little longer to solve; but it would appear that the cartridge will not work when a disk drive is connected, but not switched on.

Switching on the drive after the system had crashed and been restarted with RUN/STOP RESTORE resulted in an unearthly screech from the TV speaker. The solution is to switch the disk on *before* you touch the keyboard.

For those without a disk there is no problem: no other device has this effect. Hales had not been aware of this problem and it may well be rectified in future production runs.

The other incompatibility is with the Super Expander. You cannot have the two cartridges plugged in and in use together as they appear to use the same ROM address space: So, you get high-res graphics commands or speech but not both.

Finally the speech itself. There are 64 allophones available, which is the standard number for this sort of system. This includes the five different periods of silence used to separate words and give added emphasis to certain sounds.

The Hales unit appears to have more 'compound' allophones than the Votrax set in the Speakeasy; while this makes for fewer allophones per word, it does reduce the flexibility slightly. The majority of words can be easily understood, but two or three allophones do not sound correct. 'D' and 'V' are the worst; the 'V' sounds like an 'M' except when followed by 'ER', hence the 'F' in fig 1 to pronounce 'VIC'. The 'D' is too hard, particularly at the end of a word, although experimenting can sometimes reduce this problem.

One major drawback is the lack of inflection; the speech cannot be made to rise and fall and has a very flat pronounciation. This tends to make it more difficult to understand initially and does not allow any character to be given to the voice.

Summing up

The fact that this system uses a plug-in cartridge with the speech coming through the TV speaker

makes it very unobtrusive. Combine that with a built in allophone-to-speech converter, and this has to be a very easy system to use. At a sneeze below £70 it is very evenly matched against most of the competition, but with a number of advantages. I rate this one **good value,** although the speech quality does have room for improvement.

Wideband Speakeasy

The Speakeasy unit is mounted in a bookshelf-type hi-fi speaker enclosure about 12in high by 8in wide, with a black speaker cloth front and a wood effect finish (I was told that a revised model was about to be introduced which will be around two-thirds the size). Even so, it is large enough to make it necessary to clear a space for it; the top of the TV is too precarious and it tends to pick up hum from the TV as well.

The unit now comes complete with a lead to connect it to the user port —previously you had to order the lead separately; too bad if you forgot! There is also a phonetic input program included in the form of a printed listing.

The bad news is that the price will be going up from £69 plus VAT to £89 plus VAT, plus a further £2.50 post and insurance — a grand total of £104.85. This tops the magic £100 mark but it appears that the supplier, Cyber Robotics of Cambridge, is prepared to offer a discount to ICPUG and computer clubs. Information from Richard Springett on Cambridge 210675.

The Speakeasy requires its own mains power supply in addition to the connection to the computer.

This is where I hit my first snag. The computer, TV, disk and printer all require their own mains leads; trying to fit in a fifth plug was virtually impossible. In the end my disk drew the short straw and was unplugged. Had I been using the Speakeasy for more than a few days I would have been hard-pressed to get everything working at once without having extension leads trailing all over the room; a point to bear in mind if you suffer the same problem.

There may also be a problem connecting the unit to the Vic if you have the Arfon expansion unit. This has already laid claim to the user port for the power supply to the Vic. It can be overcome with the use of a soldering iron, but that's not a very tidy solution.

After plugging in the Speakeasy and connecting it to the computer, there is a short program which must be typed in as an example of how to make the unit speak. The program is in the instruction manual; but even in only 14 lines there was an error which would have prevented the program from running correctly. The correct version is shown as Fig 2. I was told that the manual was being 'tidied up' for issue with the revised model, so hopefully any errors will have been corrected as well.

Hi there

When you run the program the Speakeasy says "Hello" in a flat but understandable voice. To make it a little more chatty requires a good browse through the manual, since you must look up all the code numbers as well as working out which allophones to use. Fortunately there are nine and a bit foolscap pages of words with their phonetic spellings included at the back of the manual.

It is advisable to remove from the manual the sheet containing the code numbers of the allophones; you will be referring to it constantly since you have to use the code numbers rather than the allophones themselves.

The Speakeasy uses the Votrax speech synthesiser chip. It may have been my imagination, but the 64 allophones in this set seemed to be able to do more than the same number in the Hales speech unit.

```
10 REM FIRST PREPARE 6522 PIA
20 POKE37138,255
30 POKE37148,222
40 RESTORE
50 READ P
60 GOSUB 1000
70 IF P=63 THEN END
80 GOTO 50
90 DATA27,129,152,38,45,63:REM HELLO
1000 REM OUTPUT SUBROUTINE FOR VIC
1010 POKE37136,P:REM OUTPUT PHONEME
1020 POKE37148,254:POKE37148,222:REM STROBE
1030 IF PEEK(37149)=0 THEN 1030:REM READY?
1040 RETURN
```

Fig 2 - Program for Wideband Speakeasy

For example, there are five allophones of the phoneme 'O', six or 'E', seven allophones of 'U', 11 of 'A' — giving a wide variety of different vowel sounds.

There are very few 'combination' allophones such as 'AR'; but this did not matter since 'AH1, UH2,ER' on the Speakeasy produces the same sound. While this means that you have to break the speech down into far more component allophones on the Speakeasy, it does have the advantage of more scope to alter sounds if they aren't quite correct first time.

More important, there are also four levels of inflection to make the speech rise and fall. Level 0 is normal. By adding 64, 128 or 192 to the basic code number of the allophone, you obtain inflection levels 1, 2 or 3 respectively.

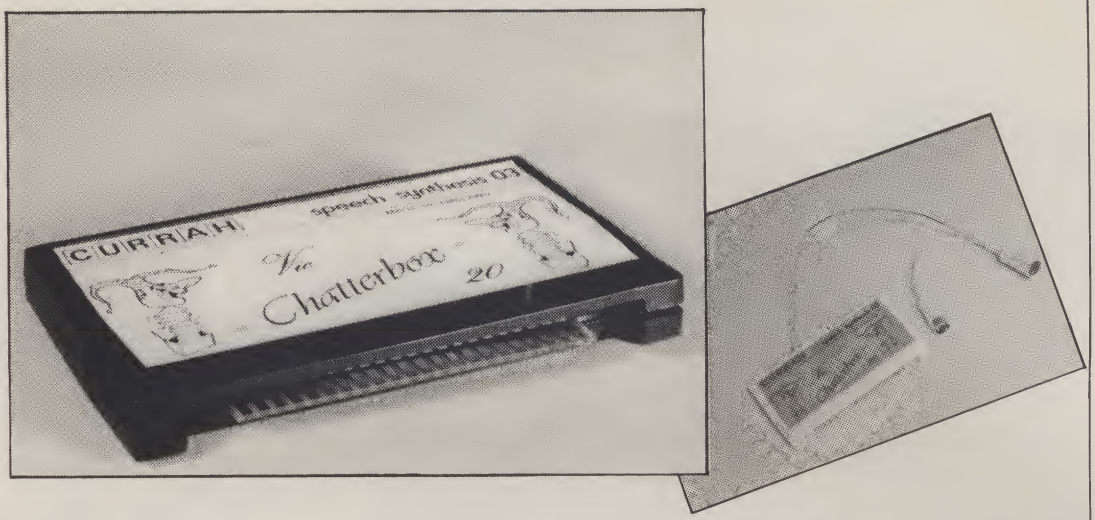
Although this further increases the time necessary to produce any quantity of speech, the result is well worth the time and effort. You are advised to have a calculator handy when you are experimenting — otherwise a slight error in adding or changing inflection levels will produce rather strange sounds.

If you enter the allophone-to-speech converter program (all 217 lines of it!) you can then type in all the allophones directly, with inflection if required, and the unit will say the word(s) and the code numbers will be displayed on the screen.

The only problem is that this conversion program is written in Microsoft Basic, which is not quite the same as Commodore Basic. The main changes required are 'PRINT' or '?' instead of '!', and ':' instead of the backslash character used as the multi-statement separator. Again, the changes required for different machines may be covered in the revised manual. It's difficult for a supplier to cover a wide range of machines all with different dialects of Basic: I feel the effort ought to be made, though.

Summing up

The Speakeasy is a fairly large unit requiring a separate power supply and is connected to the Vic user port. It is the most expensive unit of the four under consideration and it takes quite a long time to enter the required programs to get any real quantity of speech. Against that the speech quality is quite good and the time and effort spent on adding inflection pays dividends. It may well appeal to clubs and User Groups as it is available for a wide range of machines and the price to them will be rather more competitive. My verdict — **expensive, but pleasant to listen to.**



William Stuart Systems' Chatterbox

The Chatterbox from William Stuart Systems is a small black box containing a loudspeaker and the speech synthesis unit. Although it is advertised as being available for the Vic-20, when I contacted the company I was told there was a 'slight delay' and that the software for the Vic was not quite ready.

I have included the available information since it represents the lower-cost end of the market; and it should be available for the Vic by the time the article is published. The Chatterbox will appeal if you are not sure whether you really have a use for a speech synthesiser but want to try one out; or if you are short of cash and want a cheap speech system.

The unit is supplied with a Sinclair ZX81 connector, which you have to remove and replace with a Vic user-port connector. Note that you have to supply the right connector yourself — it is not included with the unit.

One advantage of this unit if you own a 'Big Ears' speech recognition system (also William Stuart's) is that there is an expansion socket on the Chatterbox into which you can plug Big Ears; this solves the problem of trying to fit both devices into the same user port.

The unit draws all its power from the host computer so there is no problem regarding a separate power supply.

The programs required to operate the system must be typed in from a printed listing. The system is driven by poking the code number of the required allophones into the relevant address in a similar way to the Speakeasy (the Chatterbox uses a different synthesiser chip from the Speakeasy, but I wasn't able to find out exactly which).

Although I cannot give any opinion as to actual speech quality, the inflection and pitch cannot be altered: so it is unlikely to produce better speech than the Hales cartridge.

The unit costs £49 + VAT for a ready-built model, £39 + VAT for a DIY kit: contact William Stuart Systems to check that the Vic-20 version is actually available before sending off any money. Also note that the company has moved recently: the address given in many of the magazines is out of date. The new one is in the panels.

Tentative opinion

This looks like a **cheap introduction** to the world of speech synthesis. Although not as unobtrusive as a cartridge it is smaller than the other stand-alone units and does not require a mains supply. For those who are handy with a soldering iron the kit **appears to represent good value** when compared to the rest of the market.

Other options

Unfortunately a review model of the Mutek **Voxbox** disappeared into the maw of the Post Office and had still not emerged by the time the article went to press.

I have seen the unit in use with other computers, though. It is very similar in many ways to the Wideband Speakeasy, even using the same Votrax speech chip. It is also mains-powered and connects to the user port of the Vic: so the comments about these on the Speakeasy apply to this unit as well.

The Voxbox comes (or would have come) already assembled in a cabinet slightly smaller than the Speakeasy, about 8x6ins. The phonetic speech program is supplied on cassette, saving a lot of typing. Because it uses the same as that in the Speakeasy; it produces a good quality of speech which is quite understandable.

The main difference is in the price. The Voxbox costs £69 + VAT plus £5 compensation parcel post, a total of £84.35 inclusive.

The Voxbox looks good — similar to the Wideband Speakeasy, but £20 cheaper. It also suffers from the same drawbacks as the Speakeasy, though the cassette program will save some time initially. The speech quality compared to the Speakeasy can only be judged by hearing both together, but the ability to add inflection makes it slightly superior to the other two systems in this respect.

Late entry

Just as the article was being typed I obtained information on a new system — a kit called **Talk-Back** at £24.95 from Maplin Electronic Supplies. The completed unit plugs into the expansion slot like a cartridge, with speech coming through the TV speaker: there are versions for the Vic-20 and the ZX81. The unit has three levels of inflection, obtained in very much the same way as the Speakeasy.

Details of construction are in Vol 2 issue 6 of the Maplin magazine 'Electronics', and further information may be obtained by contacting Maplin direct.

Conclusions

Of the units looked at in detail, there's no doubt that the Hales Speech Synthesiser cartridge is the **easiest** and the **quickest** to use with an absolute minimum of programming effort.

On **quality of speech**, however, it loses out to the Speakeasy and the Voxbox since the ability to add inflection makes a big difference to the final speech.

If **cost** is your prime consideration the Chatterbox system must warrant serious consideration.

None of the companies concerned can afford to rest on their laurels, though. Rumour has it that Commodore itself is going to produce a speech cartridge for the 64, which of course has excellent sound synthesis built in. This will be capable of altering the pitch under software control to produce a variety of different voices — male, female, a child's, even cartoon characters. Expect it this summer at around £65; more about this on the 64 Page in this issue.

Where to find the units

- **Hales Speech Synthesiser** — available through computer shops only. For information on dealers or further details contact:

  Hales Limited
  PO Box 33
  Harrowbrook Road
  Hinckley
  Leicestershire
  LE10 3DN
  0455 634746

- **Wideband Speakeasy** — available from some computer shops or from the suppliers:

  Cyber Robotics Limited
  61 Ditton Walk
  Cambridge
  CB5 8QD
  0223 210675

- **Voxbox** — available only from the suppliers:

  Mutek
  Quarry Hill
  Box
  Wiltshire
  0225 743289

- **Chatterbox** — available only from the suppliers:

  William Stuart Systems Limited
  44 Bedford Gardens
  London W8 7EH
  01-221 1131

- **Talk-Back** — available only from the suppliers:

  Maplin Electronic Supplies Limited
  PO Box 3
  Rayleigh
  Essex
  SS6 8LR
  0702 552911

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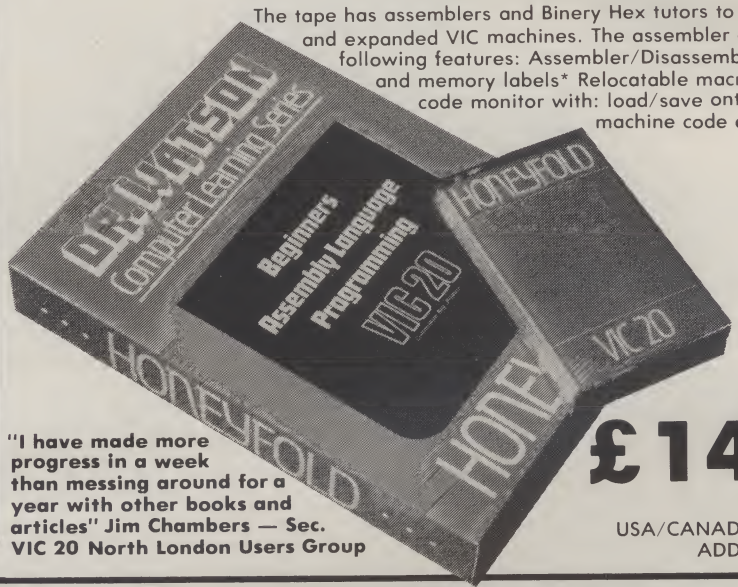

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HONEYFOLD

Honeyfold Software Limited Standfast House, Bath Place, High Street, Barnet, London.

Group identity:
a round-up of Vic-related

We've been collecting some basic information on users groups that Vic-tims might want to join. Here's the list so far — and clubs not listed are invited to contact us with information.

Britain—national

ICPUG (Independent Commodore Products User Group)
Membership Secretary
30 Brancaster Road
Newbury Park
Ilford, Essex IG2 7EP

. . . established and active, with good bi-monthly newsletter and lots of local groups (some listed here if they seem especially Vic-oriented). ICPUG shares Mike Todd with us for Vic matters. Annual sub £7.50.

London

Association of London Computer Clubs
13 cl Compton Road
London N1 2PA

. . . an umbrella organisation for two dozen London-area organisations; ALCC organises the London Computer Fair (14-16 April) among other things.

North London Hobby Computer Club
c/o Dept of Electronic & Computer Engineering
Polytechnic of North London
Holloway Road
London N7 8DB

. . . £25 pa for adults. £5 for unemployed and Poly students. Highly organised. 250 members. lots of subsections including one for Vic. They also run the Association of London Computer Clubs.

Vic 20 User Group
c/o Jim Chambers
Dept of Psychology
University College
26 Bedford Way
London WC1

. . . 30p per meeting. Includes Vics.

Berks

ICPUG Slough
c/o Brian Jones
Slough College of Higher Education
Wellington Street
Slough

. . . £5 pa. Includes Vics.

Bucks

Richard Onion
19 Frogmoor Close
Hughenden Valley
High Wycombe

. . . Is keen on setting up a local Vic group. Any takers? Call High Wycombe 3595.

Derby

ICPUG Derby
c/o Ray Davies
105 Normanton Road
Derby DE1 2GG

. . . £3 pa. Includes Vics.

Derby Microcomputer Society
c/o M. Riordan
Littleover Church Hall
Shepherd Street
Littleover

. . . £5 pa. Includes Vics.

Dorset

Bridport Computer Club
c/o M. J. Higgins
BBC Transmitting Station
Rampisham Down
Maiden Newton
Dorchester
. . . Started in January.

Bournemouth Computer Club
c/o P. Dibbs
54 Runnymede Avenue
Bournemouth BH11 9SE

. . . £5 pa. 100 members. Includes Vics.

Essex

Basildon Computer Club
c/o P. Silver
24 Havengore
Pitsea

. . . £5 pa. Includes Vics.

Gloucester

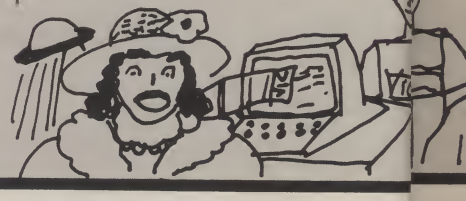
ICPUG West of England
c/o Janet Rich
Rose Cottage
20 Old Court
Springhill
Cam.
Glos GL11 5PF

Hampshire

ICPUG Hants
c/o Ron Geere
109 York Road
Farnborough

Southampton ACC
c/o Paul Blitz
Gardenways
Chilworth Tower
Chilworth
Southampton SO1 7JH

. . . Local branch of Amateur Computer Club. 100 members. £5 pa: includes Vics.



ted user groups

Herts

ICPUG North Herts
c/o B. Grainger
73 Minehead Way
Stevenage SG1 2HZ

...£7.50 pa. Includes Vics.

CRS Home Computer Club
c/o Robert Crutchfield
2 Durham Road
Stevenage SG1 4HS

...50p per meeting. Includes Vics.

Humberside

Grimsby Computer Club
c/o J. Lee
29 Park View
Cleethorpes DN35 7TG

...£8 pa. Includes Vics.

Scunthorpe Computer Club
c/o D. Needham
37 High Lees Road
Scunthorpe DN17 2QA

...£5 pa. Includes Vics.

Kent

Gravesend Computer Club
c/o The Extra Tuition Centre,
39 The Terrace,
Gravesend.
Kent DA12 2BA

...£6 pa (£3 for unwaged). About fifty members with a variety of machines including Vic.

Orpington Computer Club
c/o Roger Pyatt
23 Arundel Drive
Orpington

...Includes Vics — and CB/RTTY, if that's your bag.

Lancs

North Lancs Computer Users Group
c/o M. Forham
14 Arundel Drive
Carleton
Blackpool

...£1 pa. Includes Vics.

Merseyside

Wirral Microcomputer Users Group
c/o Mike Keegan
205 Holmlands Drive
Oxton
Birkenhead

...£3 pa. Includes Vics.

Northants

Vic-Pet Computer Club
c/o Peter Wilson
26 North Cape Walk
Corby NN18 9DQ

...meets at a pub: can't be bad!

Surrey

Croydon Micro Club
111 Selhurst Road
London SE25 6LH

Sussex

Brighton Computer Club
c/o Rod Phillippe
Hobbyist
3 The Broadway
Manor Hall Road
Southwick BN4 4ND

...£10 pa. Includes Vics.

West Midlands

Birmingham ACC
c/o Dr M. Bayliss
125 Berryfield Road
Sheldon
Birmingham B26 3UN

...Local branch of Amateur Computer club. 120 members, includes Vics. £4.20 pa.

West Midlands ACC
c/o Malcolm Sparrow
64 Showell Lane
Penn
Wolverhampton

...Local branch of Amateur Computer Club, includes Vics. £4 pa.

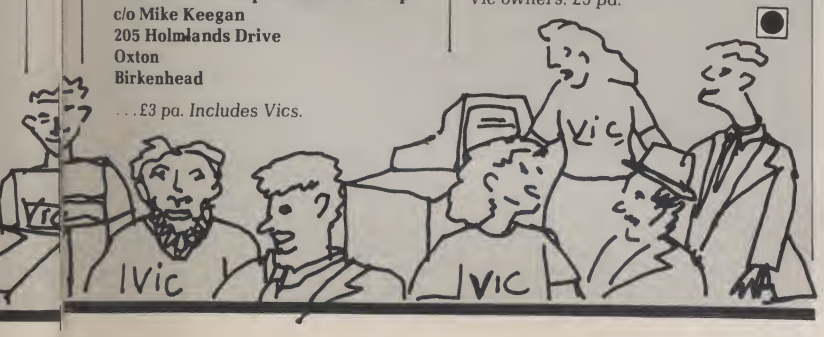
Scotland

Fife Computer Users Club
c/o Murray Simpson
31 Tom Stewart Lane
St Andrews
Fife

...£3 pa. Includes at least one Vic owner.

Edinburgh ZX Computer Club
c/o Keith Mitchell
19 Meadowplace Road
Edinburgh EH12 7UJ

...despite the name, includes some Vic owners. £5 pa.



A Punter's Progres

by J D C

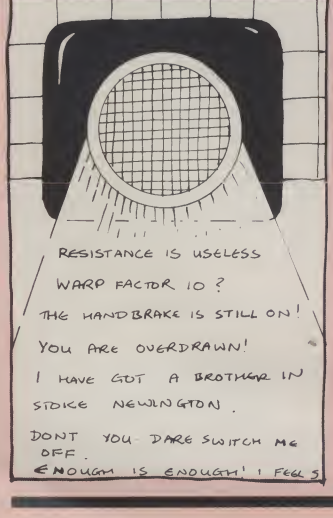
Hi folks! I have finally surfaced from the winter and all those games programs to report on progress to date.

Instant expansion

My mind has once again been turning to the problem of expanding my Vic and the whys and wherefores of powered vs unpowered expansion. While I'm saving my pennies I've been making enquiries and have found some strange things.

For example, no one seemed to want to tell me why I needed a powered motherboard. Nor which extra bits and pieces I could or could not use at the same time. Of course it is something to do with the power supply blowing up, isn't it? So why is everyone selling those *unpowered* expansion boards?

It has been mostly user-type progress, as my nephew Andrew got a Vic for Christmas and I have been communicating madly with the family ever since. Apart from Andrew's Vic breaking down in



front of the family and neighbours on Christmas Day (blush, blush) it seems to have been a great success. Andrew's version of the Vic is a more robust beast than my early model and we are much impressed.

Anyway, since then I have been kept very busy supplying Andrew with games all of which I have had to re-write to suit Andrew's preferences in colour contrasts: my typing finger (first on the right hand) is red raw!

Talk about being Bug Eyed; I was totally wrecked by the time I'd gone through all the games I had that I could alter, and then I discovered Time Duncan's 'Find' program in the Christmas Vic Computing... What joy! better late than never, eh?

If this is what those Programmers Aid cartridges are like I've got to get me one pronto, but which one? Can't wait for **Vic Computing** to do a review of the market in these things; I think I could do with some advice on which utilities are the most useful for my ever-so-average needs.

Do I remember someone asking how to keep cartridges clean and tidy? Well, 6x4in flip-top card index boxes are ideal.

I also discovered you can record Vic's output on video: but you have to retune the output signal of the video recorder, because both the video and Vic 'transmit' on channel 36 and this causes interference. You will have to retune your TV too, but if you want to add titles to the film of sister's wedding or analysis that chess game it could be useful.

I have found that I have to have my T.V. about six feet from my eyes to avoid retinal overload (my brother and nephew Andrew report the same thing) and at that distance the Vic's letters are just the right size.

I have noticed this with a lot of micros I've played with in shops, and it is a point I make to all who ask me about my Vic 20.

It also seems that after about 18 months on the market the Vic is now coming into its own where software is concerned. The new generation of games programs from the big software houses (and the more serious programs too) plus all the extra hardware goodies now appearing should hit all you new owners from the Christmas bonanza with a bang (I noticed that there wasn't a Vic-20 left in the shops by the New Year). Have you seen that lovely shiny new thing

ess: Episode Four

Collins

from Currah; a plug-in speech synthesizer no less? Will it really do what I hope it will do? Can I cope with a Space Invader that actually tells me "Resistance is useless"? Gimme gimme gimme!

Now all this has got me very confused; could **Vic Computing** set out which cartridges can be used together and which can't? All I've been able to find out (thanks to those nice people at Stonechip Electronics who are no doubt keen to find customers for their powered motherboard — soon to be launched) is that the Vic can only support about four cartridges unaided.

I'm still not sure what that is in terms of kilobytes; I assume about 32K. Yes? All this seems to me to be very important if I want to do anything clever: it will only take a 16K program with some extra graphics commands and a Programmer's Aid before I'm in trouble.

I admit I don't need it yet, maybe never will; but I wish someone could be a bit more helpful to people like me who think they might move in that direction but aren't too sure how to plan ahead. Looks like I'll have to save up for a powered motherboard after all.

And that was another strange thing, no one would sell me the Commodore Motherboard despite Commodore insisting that it was available for ready money. All very suspicious.

Using Vic?

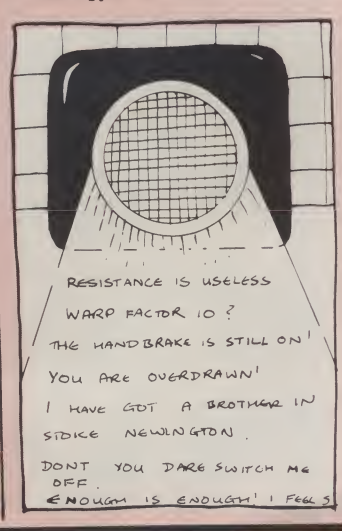
I am determined to get it all sorted out because I may be going to college later this year and I would like to be able to make use of my Vic for word processing on essays — and maybe as a data base for study notes too. I'll need a lot of expansion for that (disk, printer etc.) and I want to be sure I can get a system that will work in time to get used to it before I have to use it regularly.

I'm not sure I *can* use my Vic like this, but the experiences of David Calderwood reported in the February **Vic Computing** would suggest it may be possible. I wonder if any other Vic user has experience of this sort of think?

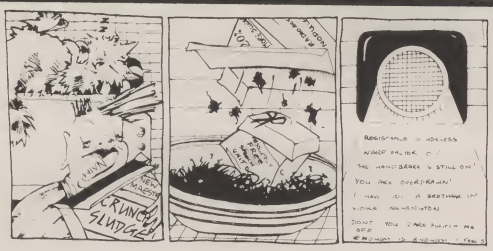
That issue was also most informative on the matter of word processors; I've made my mind up already (I think). It might have helped to see a photo of the screens, as the display mode seems to be so different for each package reviewed. Anyway, please could you also do a review of the various database packages on the Vic?

Talking of disks and databases and things, I had written off to Simple Software (who do the Simply Write word processor) to see if they would be putting it (and their database) on to any of those new fangled mini-floppy disks that everyone is talking about. I thought at that time that they might be cheaper; anyway, Simple Software seemed willing enough but very sceptical about the new disks — so sceptical in fact that after adding up the little extras that these new disks will need to interface with the Vic, they don't seem such a bargain after all — at least not for the year or two that it seems to take new ideas to get established in the microcomputer market. Beware of the Micro-Hype, I tell myself.

I have also given up the idea of El-Cheapo printers for similar reasons. By the time you add on the interface needed for the Vic the price is barely economical if you want fair copy and not just a program print out. It all looks like being a costly affair this year. But then we will be in the vanguard of technology, won't we?



Letters



All the indications are that prices drop rapidly abot 18 months after I decide I have to have something. So if you have only just got your Vic, take heart: by next year all these goodies will be free with your breakfast cereal and I will still be paying for my bank loan!

Dealing with dealers

Harking back to my nagging criticisms of the colour clarity of many programs, I took my own advice the other week and asked for a demo of a game in Laskys — and was given the distinct impression that for £6 it wasn't worth their effort. Not when I wasn't going to buy a £500 system.

Well, so much for the High Street Micro Store: and Laskys are not the only High Street people to be so snooty when it comes to less than a megabuck sale. Despite the long journey it seems I shall be returning to the nice little North Acton computer shop where I got my Vic from in the first place.

My advice: find a good shop and stick to it.

My programming is only just creeping along. It doesn't matter how much time I have: there is never enough to think about all those things that don't make sense.

So, go to night classes I though — the perfect answer. Out of the group I am in about a quarter have a home computer and the rest do not. But no-one understands the lecturer at all. He is *appalling*. So bad that we have to have self-help groups at coffee time to sort out what he has been saying.

Last week he took three hours to explain what arrays were — not how to use them or do clever things with them, just what an array is. I admit I didn't know before we started: but *three hours*, I ask you!

Anyway, I've paid my fee and I'm going to stick it out to the bitter end. Meanwhile I must get my brain wrapped around Vic's graphics, and Kevin Smart's new series looks just the sort of thing I need. But first I must just find time to enter that interesting 'Mother Hen' program.

My earlier mention of disks and such reminds me of recent temptation by the siren song of the new Commodore 64. Retro me satanus; go on, admit it — you have too haven't you.

I decided against deserting my faithful Vic for a number of reasons — not least of which is that whatever you may hear, no-one has done anything about a trade-in for the Vic yet; so don't get too excited by the idea. (I too have my spies and they report no sign of movement in the Commodore's camp.)

Eye sore

The other reason has to do with what you might call 'viewer fatigue'. I have checked out the 64 in a couple of micro stores, and have concluded that for my comfort the size of the letters is just too small to be readable unless the screen is about two feet from my nose; which is all right for word processing, but for games-playing the colour intensity at that distance is unbearable.

I wonder when we will see a plug in Prestel adaptor. I know there are problems with the Vic's display — but surely it's othing a few kilobytes couldn't solve, and if we are to derive all the benefits of home computing we will need Prestel or something like that.

And what about ready-made databases? Are we ever likely to see the Encyclopaedia Brittanica or Roget's Thesaurus on a set of floppy disks? These and other questions I leave to our worthy editor to answer. Meanwhile, wear your Vic with pride.

Editor's comment: *Flip-top boxes are fine, but they don't hold many cassettes. We use those slot-together cassette storage modules — they hold 8 or 10 or 12 tapes apiece, cost between £4 and £7, and just slot together. You can hang them up, too.*

Yes, ok: we've commissioned a piece on which cartridges can and can't be used together. As for filing systems, there's a couple reviewed in this issue with more reviews coming. Also here — a review of the Currah speech unit and its competitors. Clever how we anticipate JD, isn't it?

As for plug-in Prestel, watch out for a piece on Micronet in our next issue...

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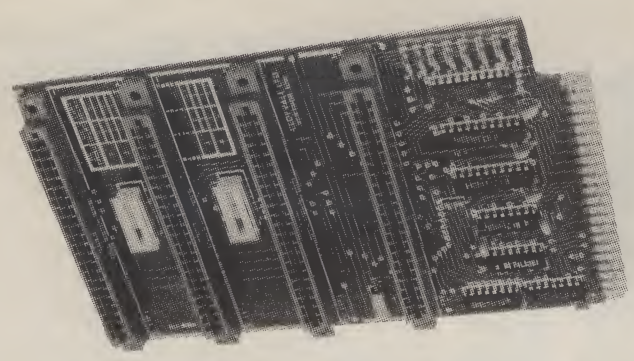

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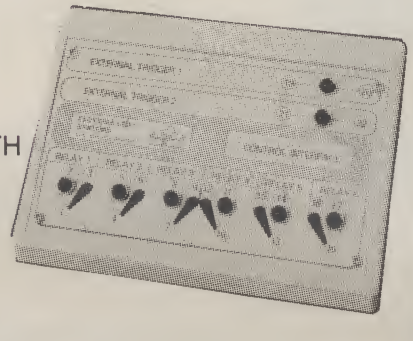

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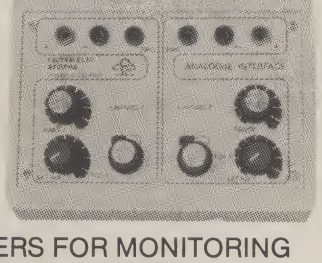

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DAM!

by D Williams

This is a nice simple game of irritating difficulty and potentially hypnotic complexity from D. Williams of Stockport.

It's all pretty explicit — 'nibblers' assault the dam (the thickness of which you decide) and if they breach it the (somewhat low-res) city is inundated.

The nibblers pause briefly en route to their target, which gives you the chance to zap them. For this you use a bomber-style approach. You scoot along the top of the screen with excellent sound effects and have to stop directly above the paused nibbler in order to bop it.

```
2 REM*BY D.WILLIAMS
3 PRINTCHR$(142)
4 SC=7680:CL=38400
5 POKE36879,172:PRINT"▯"
6 FORJ=1TO5
10 PRINT"▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯         "
20 FORI=0TO300:NEXT
30 PRINT"▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯**********"
40 PRINT"▯▯▯▯▯▯▯***DAM***
50 PRINT"▯▯▯▯▯▯▯**********"
60 FORI=0TO300:NEXT
70 NEXT
80 PRINT"▯▯INSTRUCTIONS?"
90 GETA$:IFA$<>"N"ANDA$<>"Y"THEN90
100 IFA$="Y"THENGOSUB10000
110 PRINT"▯THICKNESS OF DAM(1-3)":INPUTT:S=0
120 IFT<1ORT>3THEN110
130 PRINT"▯"
140 FORI=0TO20
150 PRINT"▯▯     "
160 NEXT
170 PRINT"▯     ▯"
180 FORY=1TO22
190 FORX=4TO3+T
200 POKESC+X+22*Y,231
205 POKECL+X+22*Y,0
210 NEXT:NEXT
220 PRINT"▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯"
230 PRINT"▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯"
240 PRINT"▯▯▯▯▯▯▯▯▯▯▯▯▯▯H▯▯▯▯H▯▯▯▯▯"
250 PRINT"▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯"
260 PRINT"▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯"
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285 PRINT"▯▯▯▯▯▯▯▯▯▯▯▯"
286 PRINT"▯▯▯▯▯▯▯▯▯▯▯   "
287 PRINT"▯▯▯▯▯▯▯▯▯▯▯   /|\▯"
290 POKE36878,15:Y=INT(RND(1)*22+1):P=32:C=0:G=0:H=0
300 FORX=20TOINT(RND(1)*13)+8STEP-1
310 POKESC+X+1+22*Y,P:POKECL+X+1+22*Y,C
320 P=PEEK(SC+X+22*Y)
330 C=PEEK(CL+X+22*Y):POKE36876,180
340 POKECL+X+22*Y,6
350 POKESC+X+22*Y,61:POKE36876,220
360 POKESC+X+22*Y,62:POKE36876,0
380 NEXT
390 POKE36876,0
400 POKE36878,7:FORX1=0TO21:POKE36877,230-2*X1
410 POKESC+X1,60:POKECL+X1,4
420 POKESC+X1-1,32
430 PE=PEEK(203)
440 IFPE=32ANDG=0THENGOSUB1000:G=1
450 POKE36877,0:NEXT
455 POKE36878,15:POKESC+21,32
460 IFH=1THEN600
470 POKESC+22*Y+X+1,P:POKECL+22*Y+X+1,C
480 P=PEEK(SC+X+22*Y):C=PEEK(CL+X+22*Y):POKE36876,180
490 POKECL+X+22*Y,6:POKE36876,220
500 POKESC+X+22*Y,61
510 POKESC+X+22*Y,62:POKE36876,0
520 IFP=231THEN550
535 X=X-1:IFX>0THEN470
550 POKESC+X+22*Y,32
560 IFPEEK(SC+X-1+22*Y)=160ORPEEK(CL+X-1+22*Y)=6THEN3000
600 GOTO290
1000 P1=32:C1=0
1001 POKE36877,0
1005 FORY1=0TO22
1006 POKESC+X1+22*(Y1-1),P1:POKECL+X1+22*(Y1-1),C1
1007 POKE36876,230-2*Y1
1010 P1=PEEK(SC+X1+22*Y1):C1=PEEK(CL+X1+22*Y1)
1020 POKECL+X1+22*Y1,0:POKESC+X1+22*Y1,46
1030 IFP1=62THEN2000
1035 FORI=1TO10:NEXT
1040 NEXT
1050 POKESC+X1+22*(Y1-1),P1:POKECL+X1+22*(Y1-1),C1
1060 POKE36876,0:POKE36878,0:RETURN
2000 POKE36877,176
2010 FORV=15TO0STEP-1
2020 POKE36878,V:FORU=1TO100:NEXT:NEXT
2030 POKE36877,0:POKE36876,0
2050 POKESC+X1+22*Y1,P:POKECL+X1+22*Y1,C
2060 S=S+1
2070 PRINT"▯▯▯▯▯▯▯▯▯▯"S
2075 H=1:RETURN
2080 RETURN
3000 FORY3=22TOY+1STEP-1:POKE36876,230-Y3
3010 FORX=5TO21
3020 POKESC+X+22*Y3,160
3030 POKECL+X+22*Y3,6
3040 NEXT:NEXT
3045 POKE198,0
3046 POKE36876,0
3047 IFS>HITHENHI=S
3050 PRINT"▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯YOU BLEW IT!"
3060 PRINT"▯▯▯▯▯THE CITY'S BEEN"
3065 PRINT"▯▯▯▯▯▯▯▯DROWNED."
3070 PRINT"▯▯▯AND YOU SCORED"S
3080 PRINT"▯▯▯▯▯▯▯▯HI="HI
3085 FORI=1TO6000:NEXT
3086 PRINT"▯ANOTHER GO?":GETA$:IFA$=""THEN3086
3087 IFA$="Y"THEN110
3090 END
10000 PRINT"▯"CHR$(14);
10010 PRINT"       ***▯▯\***"
10020 PRINT"       ___________"
10030 PRINT"  ▯OUR MISSION IS TO▯"
10040 PRINT"SAVE THE CITY FROM THE"
10050 PRINT"ATTACKING /IBBLERS▯"
10060 PRINT"WHO WILL TRY AND EAT▯"
10070 PRINT"THE DAM, AND FLOOD THE"
10080 PRINT"CITY."
10090 PRINT"▯▯RESS ANY KEY"
10095 GETA$:IFA$=""THEN10095
11000 PRINT"▯▯IRST THE /IBBLER WILL"
11010 PRINT"CRAWL ALONG THE SCREEN"
11020 PRINT"THEN IT WILL STOP FOR▯"
11030 PRINT"SECOND, AND NOW IS▯"
11040 PRINT"YOUR CHANCE TO STOP IT"
11050 PRINT"BY FIRING AT IT WITH▯"
11060 PRINT"THE ▯▯▯▯ |▯_▯."
11070 PRINT"▯▯RESS ANY KEY TO START"
11080 GETA$:IFA$=""THEN11080
11090 PRINTCHR$(142):RETURN
```

Get out of this:

by John Hurll

```
10 REM 3-D MAZE******
20 REM FOR VIC-20****
30 REM BY J.HURLL****
100 O=7680:T=38400:L=419:HC=0:MC=0:M$="N":CN=0:LM=0:D$="NORTH"
105 POKE36879,31:POKE36878,15:GOSUB5200
115 GOSUB4200
120 GOSUB999
125 GETX$:IFX$<>"*"THEN125
130 POKE36866,0:GOSUB999
140 GOSUB1510
150 GOSUB3050
170 GOSUB2000:GOSUB4000:LM=0
175 PRINT"YOU ARE FACING ";D$
180 POKE36866,150
190 MM$=M$
200 POKE198,0
210 GETM$:IFM$=""THEN210
215 IFM$="H"THENHC=HC+1:GOTO120
218 GOSUB5200
220 POKE36866,0:GOSUB999
230 GOSUB3000:IFLM=1THENM$=MM$:GOSUB5220:GOSUB5100:GOTO170
240 MC=MC+1:LM=0
250 IFM$="N"THENL=L-22:D$="NORTH"
260 IFM$="E"THENL=L+1:D$="EAST "
270 IFM$="S"THENL=L+22:D$="SOUTH"
280 IFM$="W"THENL=L-1:D$="WEST "
285 IFL=43THENPOKE36866,150:GOTO4100
290 GOTO140
999 GOSUB5000:POKEO+L,42:POKET+L,5:RETURN
1510 IFM$="N"THENA=O+L-1:B=O+L-22:C=O+L+1
1520 IFM$="E"THENA=O+L-22:B=O+L+1:C=O+L+22
1530 IFM$="W"THENA=O+L+22:B=O+L-1:C=O+L-22
1540 IFM$="S"THENA=O+L+1:B=O+L+22:C=O+L-1
1570 RETURN
2000 PRINT""
2005 PRINT""
2010 PRINT""
2015 PRINT""
2020 PRINT""
2025 PRINT""
2030 PRINT""
2035 FORI=1TO6:PRINT"":NEXTI
2036 PRINT""
2037 PRINT""
2040 PRINT""
2045 PRINT""
2050 PRINT""
2055 PRINT""
2060 PRINT""
2070 RETURN
3000 IFM$="N"ANDPEEK(O+L-22)=160THENLM=1
3010 IFM$="E"ANDPEEK(O+L+1)=160THENLM=1
3020 IFM$="W"ANDPEEK(O+L-1)=160THENLM=1
3030 IFM$="S"ANDPEEK(O+L+22)=160THENLM=1
3040 RETURN
3050 IFPEEK(A)=32ANDPEEK(B)=160ANDPEEK(C)=160THENCN=1
3060 IFPEEK(A)=160ANDPEEK(B)=160ANDPEEK(C)=32THENCN=2
3065 IFPEEK(A)=160ANDPEEK(B)=160ANDPEEK(C)=160THENCN=3
3070 IFPEEK(A)=32ANDPEEK(B)=32ANDPEEK(C)=160THENCN=4
3075 IFPEEK(A)=160ANDPEEK(B)=32ANDPEEK(C)=32THENCN=5
3080 IFPEEK(A)=32ANDPEEK(B)=32ANDPEEK(C)=32THENCN=6
3085 IFPEEK(A)=32ANDPEEK(B)=160ANDPEEK(C)=32THENCN=7
3090 IFPEEK(A)=160ANDPEEK(B)=32ANDPEEK(C)=160THENCN=8
3095 RETURN
3100 PRINT"":RETURN
3200 PRINT"":RETURN
3300 FORI=0TO7:FORJ=0TO110STEP22:POKEO+161+I+J,160:POKET+161+I+J,4:NEXT:NEXT
3310 RETURN
3400 PRINT""
3410 PRINT""
3420 RETURN
4000 IFCN=1THENGOSUB3200:GOSUB3300
4010 IFCN=2THENGOSUB3100:GOSUB3300
4020 IFCN=3THENGOSUB3100:GOSUB3200:GOSUB3300
4030 IFCN=4THENGOSUB3200:GOSUB3400
4040 IFCN=5THENGOSUB3100:GOSUB3400
4050 IFCN=6THENGOSUB3400
4060 IFCN=7THENGOSUB3300
4070 IFCN=8THENGOSUB3100:GOSUB3200:GOSUB3400
4080 RETURN
4100 PRINT"YOU'VE DONE IT!"
4110 PRINT"YOU COMPLETED THE MAZE"
4120 PRINT"IN";MC;" MOVES AND"
4130 PRINT"CALLED FOR HELP";HC
4140 PRINT"TIMES."
4150 PRINT"ANOTHER GO ?"
4160 GET E$
4170 IFE$="Y"THENRUN
4180 IFE$="N"THENPRINT"":POKE36879,27:POKE36878,0:END
4190 GOTO4160
4200 GOSUB2000:GOSUB3100:GOSUB3200
4210 PRINT"3-D MAZE"
4220 PRINT" FOR VIC-20"
4230 FOR I=1TO4000:NEXT:RETURN
5000 PRINT"";
5010 PRINT"";
5020 PRINT"";
5030 PRINT"";
5040 PRINT"";
5050 PRINT"";
5060 PRINT"";
5070 PRINT"";
5080 PRINT"";
5090 PRINT""
5095 PRINT"PRESS '*' TO CONTINUE"
5099 RETURN
5100 POKE36866,150:PRINT"ILLEGAL MOVE,TRY AGAIN"
5110 FORI=1TO3000:NEXT
5120 POKE36866,0:RETURN
5200 FORS=200TO250STEP10:POKE36876,S:FORI=1TO80:NEXT:NEXT:POKE36876,0
5210 RETURN
5220 POKE36874,150:FORI=1TO500:NEXT:POKE36874,0:RETURN
```

3D MAZE

I have occasional access to a Pet at work and have always enjoyed the 3-D Maze game that we have for it. Unfortunately it uses more memory than is available on the unexpanded Vic. Commercially advertised versions of this game for the Vic all seem to require a 3K memory expansion: I therefore decided to write my own version to fit in a 3.5K Vic.

How to play

When the program is run you will be presented with a plan view of a maze with a little green star in the lower left hand corner. This is you, and the idea of the game is to get to the exit at the top right of the maze by finding your way through the corridors of the maze.

Press the asterisk key and you will find yourself looking up the first corridor. A message at the bottom of the screen tells you which direction you are facing. Pressing N, E, W or S then moves you in the appropriate direction.

In your travels through the maze you will see passageways off to the left and right; crossroads (no, not the soap opera); and — if you're unlucky — dead ends.

If you get lost, pressing H (Help) will return you to the plan view and the little green star will show you where you are.

When you finally get to the end, the Vic will tell you how many moves it took you, and how many times you called for help.

How it works

Lines 100 to 290 control the flow of the program and call up subroutines as necessary. The plan view is printed by PRINT statements in the subroutine starting at 5000. In order to determine whether to print a straight corridor, crossroad, dead end etc. the program has to look at the plan view, PEEK at the three squares ahead, and call up the appropriate subroutine. In order that the plan view is not visible while the program is doing this the screen is blanked with a POKE 36866,150 (Lines 130 and 220) and is returned to normal with a POKE 36866,150 (Line 180).

The little green star is moved around the maze by lines 250 to 280. This is really the heart of the program, but it is invisible unless 'H' is pressed — in which case the program is sent back to line 120 to display the current position of the little green star.

Line 285 checks to see if you have completed the maze and, if so, finishes the game.

If you want to make up your own maze, simply change the PRINT statements in lines 5000 to 5090. Each of these lines prints two lines of the plan view of the maze. It is an easy matter to make up a maze on squared paper; make sure, however, that you use the correct amount of spaces and cursor rights to fill two lines exactly.

Have fun!

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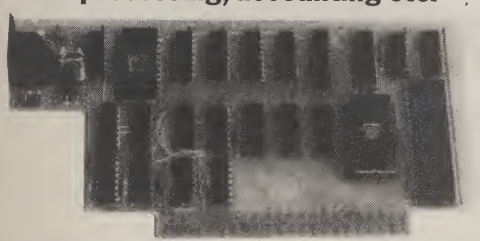

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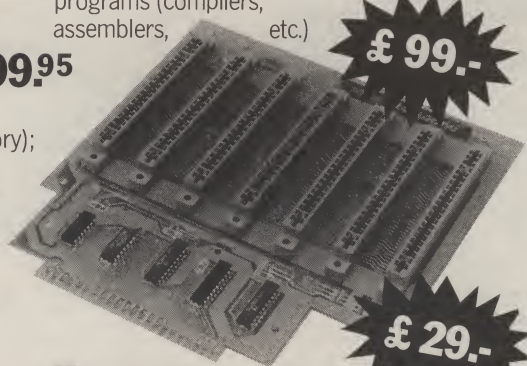

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Memory Expansion

If you want to expand your VIC with more memory you'll need this unique expander. Now you can have 7 more slots for programmers aid, RAM packs, etc. Computer World offers you this expander (with 1 slot completely tested) for £ 29.- (Add. £ 4.- for each extra connector).

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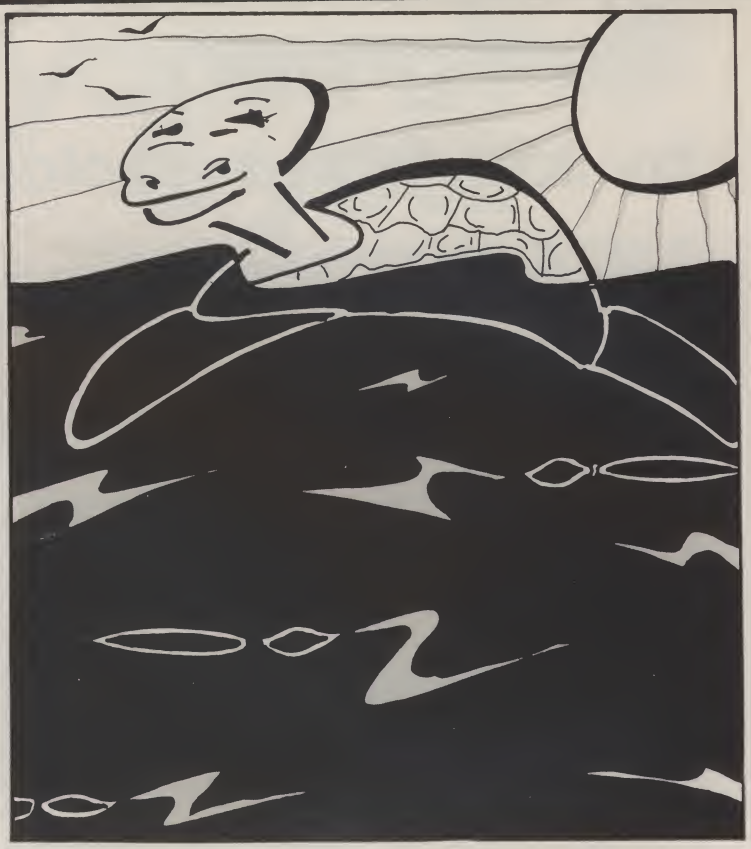


Turning to Turtle

by Andy Pearce

Though the graphics commands added to Vic Basic by the Super Expander cartridge are powerful for many applications, they do have a number of fundamental shortcomings. Andy Pearce has a solution.

The most glaring ommission is the absence of a 'Move to' command, which would allow non-plotting movement on the high resolution screen. Of course you could always draw a line in the screen colour; but that might well create havoc with the lines already on the screen. Alternatively, one could write a routine to work out the new plotting position: but surely the high level plotting commands on the Super Expander are meant to obviate that need.

A less immediately obvious fault is one which is not confined to the Super Expander of the Vic, but one which is common to nearly all systems which are able to utilise a bit-mapped display under Basic.

The Cartesian plotting system, using X,Y co-ordinates with reference to a fixed set of values, is fine for drawing parallel to the edges of the screen. But if you need to draw shapes at an angle to the sides you must either resort to trigonometry (ugh) or use graph paper to work out the endpoints of lines before you start to use the computer. If you need to do this, what's the point of having the computer?

Turtle time

Luckily there is a solution, but it is rarely implemented in Basic. Turtle graphics are limited almost exclusively to procedural languages such as Pascal and Logo.

The advantage of turtle graphics is that they use a local or self-referential co-ordinate system. The basic commands merely tell a shape on the screen to move a certain distance, turn by a certain angle, and whether or not to draw a line behind it. With these commands, however, one has much more power over the screen than with an X,Y system.

Turtle graphics originated with the Logo language, and it must be said that they are best suited to this environment. The definition of procedures adds to their simplicity and power. Even in Basic, however, complex geometric designs can be created with just a few inputs; and as such, Turtle graphics are particularly useful for children to learn geometry with.

All very well, you may say, but the Vic does not have Turtle Graphics! Until now, that is: if you do have the Super Expander, try entering this program.

This implementation of Turtle Graphics is rather crude but does give some idea of their usefulness. It uses that most humble of Super Expander commands, POINTS. With a little ingenuity one could reproduce it on an unexpanded Vic using POKES but the resolution would be insufficient to appreciate the effects to any great extent. The annoying thing is that it would have taken very little effort for Commodore to write Turtle graphics commands for the super expander. Combined with the present commands it would have been a really useful package.

Contact point

Friends of the Turtle
P.O. Box 1317
Los Altos
CA 94022
U.S.A.

Logo logic

Despite the increased power of this graphics system compared to the traditional one, because it is written in Basic and interpreted from input, it is very slow, certainly too slow for general applications. One alternative is to write it in machine code — preferably on an EPROM. This still does not overcome the laborious step by step construction of the designs.

The answer is to implement Turtle graphics in its original environment — the language LOGO. LOGO will not, however, become available for the Vic 20 because the Vic is limited to a maximum of 32K and a proper version of LOGO requires at least 48K. Apparently Commodore is working on a LOGO cartridge for the Vic 64, which will be able to use the computer's sprite graphics too. It should be the most versatile Logo available on any Micro.

Read on

- Abelson, Harold & Disessa, Andrea: **Turtle Graphics: The Computer as a Medium For Exploring Mathematics.** MIT Press. 1981.
- Papert, Seymour: **Mindstorms — Children, Computers and Powerful Ideas.** Basic Books Inc 1980.


```
1 REM TURTLE GRAPHICS BY ANDY PEARCE
2 FLAG=0
5 X=757:Y=512
6 INPUT"ANGLE";ANGLE
7 INPUT"STARTING ANGLE";DGREES
8 INPUT"LENGTH";LNGTH
9 INPUT"TURN BY";TURN
10 RDIAN=3.142/180
30 RDIAN=RDIAN*DGREES
40 FOR2
50 CHI=COS(RDIAN)
60 SIGMA=SIN(RDIAN)
75 X=X+CHI:Y=Y+SIGMA:LINE=LINE+1:FLAG=FLAG+1
80 READ2,X*8,7,Y
90 IFLINE=LNGTHTHEN120
100 GOTO75
120 LINE=0:DGREES=DGREES+ANGLE
130 IFFLAG>0ANDX>753THEN140
135 GOTO150
140 IFX<761THEN145
143 GOTO150
145 IFY>505ANDY<517THENDGREES=DGREES+TURN
150 GOTO10
```

Multigraph

by Jonathon Reynolds

So you've got your Super Expander. Tired of playing games with it? Want to see what it is capable of? Well, an obvious task for it would be 'proper' graph plotting. But how to do it? Simple, with this small Basic routine.

But first we have two stumbling blocks to overcome. One is the way the screen is organized normally: it is of little use to us. Instead of having the 0,0 point in the top left hand corner, it would be more useful in the centre of the screen.

The other obstacle is the way the screen matrix values run from 0 to 1023; from this you get only 160 plottable points in each direction (GRAPHIC MODE 2). Therefore to plot a point in the centre of the screen you have to enter POINT 2,512,512.

An easy way of avoiding these 'big' numbers is to think of the point you want to plot in a 0 to 159 matrix and multiply these values by a suitable scaling factor. The scaling factor is derived by dividing 1024 by 160 to get 6.4.

So to plot a dot using this method one enters POINT 2,X*6.4,Y*6.4.

All right, that's solved our problems up to a point (as it were). But we really need values to run from a negative to a positive value (– n to + n.)

Well, both obstacles can be overcome with this simple Basic routine. It will have to be used every time we wish to plot a point; but it will leave us free to think of the screen co-ordinates running from – n to + n. through a central point. Listing 1 provides the routine.

Listing 1

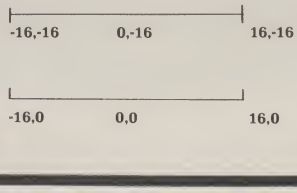
```
6000    A = 5:B = 6.4:C = 16
6010    GRAPHIC 2
6020    FOR I = – 16 TO 16
        STEP 0.01
6030    Z = SIN(I)*C
6040    X = (80 + A*I)*B
6050    Y = (80 – A*Z)*B
6060    POINT 2,X,Y
6070    NEXT
```

Line	Description
6000	Initialise variables
6010	Jump to 160*160 GRAPHIC 2 mode
6020	Set up a loop from – 16 to 16 with an increment of 0.01 (– 16 to + 16 is our graph's range)
6030	Z is the value returned by our function, C is used to enlarge the result
6040-50	Our routine to convert the co-ordinate system we are using the computer's 0-to-1023 matrix. The value 80 represents the centre of the screen: A is the integer unit offset (ie there will be five points between 1 and 2, 2 and 3, etc.). I holds where we are on the X-axis, Z is where we are on the Y-axis. And B is our scaling factor. So if I = 10 and Z = – 5, then X = 832 and Y = 672. Hey Presto! We have co-ordinates which match the computer's matrix pattern.
6060	This line actually plots the point.
6070	Goes back until the plot is complete

What we actually did then was to go through three stages:

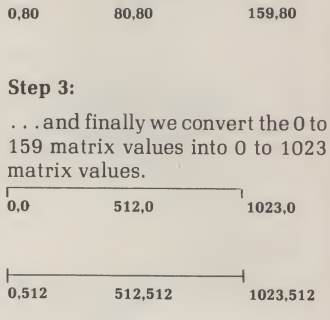
Step 1:

This is how we wish to see the screen. . .



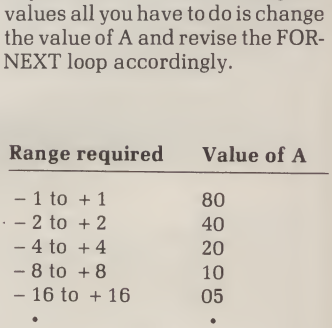
Step 2:

. . . so we convert the values into a 0 to 159 matrix. . .



Step 3:

. . . and finally we convert the 0 to 159 matrix values into 0 to 1023 matrix values.



If you want a different range of values all you have to do is change the value of A and revise the FOR-NEXT loop accordingly.

Range required	Value of A
– 1 to + 1	80
– 2 to + 2	40
– 4 to + 4	20
– 8 to + 8	10
– 16 to + 16	05
•	•
•	•
•	•
– 40 to + 40	02
– 80 to + 80	01
– 160 to + 160	0.5

Feel free to experiment! It's impossible to harm the Vic by doing so.

How to use Multigraph

Multigraph can be considered a mathematician's tool which allows you to plot up to five functions on the screen at the same time. This allows for quick and easy comparisons to be made and complex functions to be built up and examined in detail.

If the program is entered exactly as shown, the following functions will be in memory:

Line number	Function
1000	Z = SIN(I-1.6)*5-7.5
2000	Z = COS(-I + .1)*5-7.5
3000	Z = – SIN(I)/I*5 + 7
4000	Z = SIN(I)/I*5 + 7
5000	Z = SIN(I + 1.6)*2

To change any of these functions simply LIST the required line, position the cursor just past the equals sign, and enter the function using the variable I (which will range from – 5 to + 15 during the plot).

When done hit RETURN and the function will be ready for use.

The functions will be executed in order of appearance in the program — line 1000 first and 5000 last. If just one function is required, enter the rest of the functions as Z = 0.

Running the program

To start the program type RUN and hit RETURN. The screen will be white and the characters black.

In the middle of the screen the program will ask "INCREMENT?" Respond with a number greater than zero but less than fifteen (the smaller the value the greater the number of dots plotted, thus the smaller the skip).

After you hit RETURN the border will change to green and the X and Y axes will be drawn; the Vic will then beep and the first function will start to be plotted.

The program will continue until all five functions have been plotted. When the program starts a new function the Vic will beep. At the completion of the functions the screen will remain but the border will be red. Hitting any key will end the program and take you back to text or GRAPHIC 0 mode.

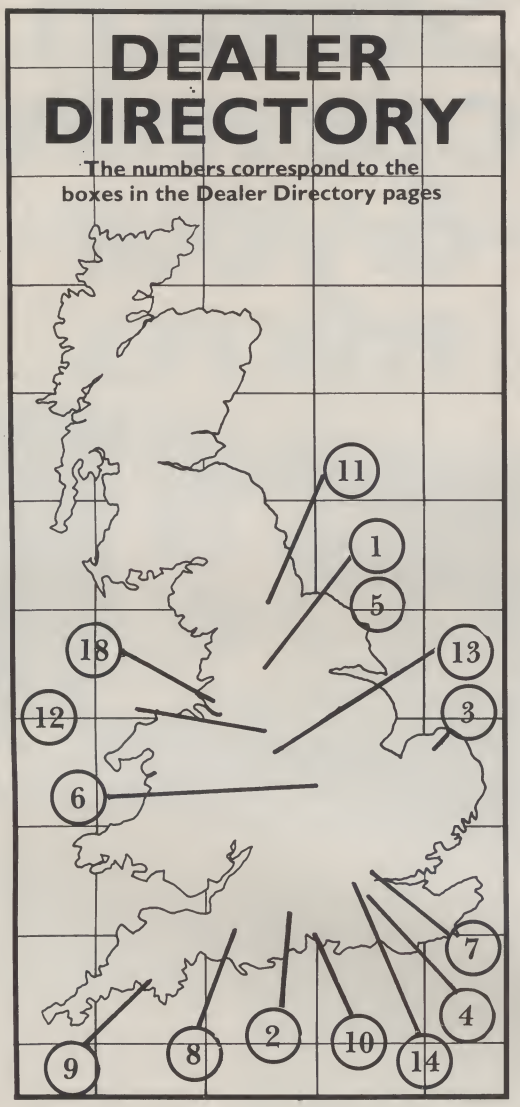
To pause the program at any time during the plot, hit any key except RETURN. The border will change to yellow and plotting will cease. To continue, hit anything but RETURN; and the border will return to green and plotting will resume from where it left off.

To halt the program completely use RETURN. The screen will remain but the border will be red. Hitting any other key will return the screen to text or GRAPHIC 0 mode and end the program.

```
0 REM****************
1 REM* "MULTIGRAPH" *
2 REM*      BY      *
3 REM*  J.REYNOLDS  *
4 REM*132/1. VIA DEI*
5 REM*  COLLI DELLA *
6 REM*   FARNESINA  *
7 REM*  00194  ROMA *
8 REM*    ITALIA -  *
9 REM****************
10 DIM1,3,0,0
20 DIMZ,X,Y,F,I,J,K,L,ZX,ZY,OF,RA,RB
25 K=6.4:ZX=80:ZY=80:OF=5:RA=-15:RB=15
30 PRINT"■■■■■  *** MULTIGRAPH ***■■■"
40 PRINT"■■■■■■■■■■■■■ BY JONATHON REYNOLDS ■■■■■■■■■"
50 INPUT"     INCREMENT";J
60 IFJ<=0ORJ>=15THENPRINT"■■":GOTO40
70 POKE650,127:FOR2:DIM1,5,0,0:GOSUB300
99 :REM***************
100 REM*PLOT FUNCT.*
101 REM***************
110 FORF=1TO5:PRINT"QT4A";
120 FORI=RATORBSTEPJ:IFI=0THENNEXT
125 ONFGOSUB1000,2000,3000,4000,5000
130 GETA$:IFA$<>""ANDA$<>CHR$(13)THEN:DIM1,7,0,0:GOSUB400
135 IFA$=CHR$(13)THENGOTO200
140 X=(ZX+OF*I)*K:Y=(ZY-OF*Z)*K
150 IFY<0ORX<0ORX>159*KORY>159*KTHEN170
160 READ2,X,Y
170 NEXT
180 NEXT
199 REM***************
200 REM*END PROGRAM*
201 REM***************
210 DIM 1,2,0,0
220 GETA$
230 IFA$=""THEN220
240 FOR:DIM1,3,0,1:POKE650,128:END
299 REM************
300 REM*AXES X,Y*
301 REM************
310 INPUT#2,OF*K,ZX*KTOK*(160-OF),ZX*K:INPUT#2,ZY*K,OF*KTOZY*K,K*(160-OF)
320 FORI=OF*KTO155*KSTEPOF*K:READ2,I,K*(ZX+2):READ2,K*(ZY+2),I:NEXT:RETURN
399 REM********
400 REM*PAUSE*
401 REM********
410 GETA$:IFA$=""THEN410
420 DIM1,5,0,0:RETURN
997 REM************
998 REM*FUNCTIONS*
999 REM************
1000 Z=SIN(I-1.6)*5-7.5
1010 RETURN
2000 Z=COS(I+.1)*5-7.5
2010 RETURN
3000 Z=-SIN(I)/I*5+7
3010 RETURN
4000 Z=SIN(I)/I*5+7
4010 RETURN
5000 Z=SIN(I+1.6)*2
5010 RETURN
6000 REM***************
6010 REM* ENTER THE *
6020 REM* FUNCTIONS *
6030 REM* IN  LINES *
6040 REM* 1000-5000 *
6050 REM*   USING   *
6060 REM*  Z=FUNCT. *
6070 REM***************
```

DEALER DIRECTORY

The numbers correspond to the boxes in the Dealer Directory pages



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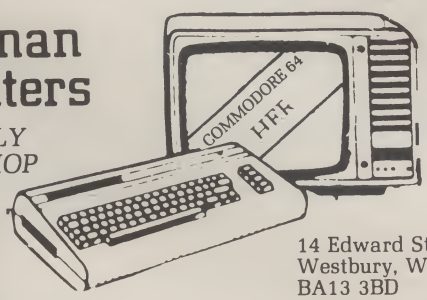

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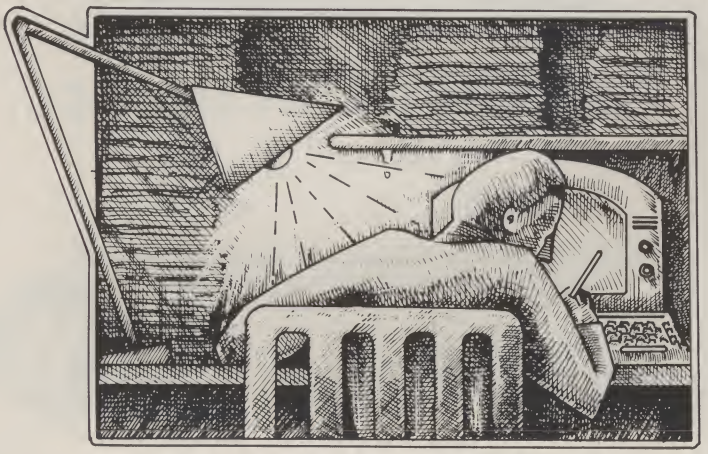

Dear Tommy, I have mastered the technique of using POKE 36869,255 to send the machine to byte 7168 for its characters instead of byte no. wotsit in the character generator ROM. All well and good, and I used this technique a lot for creating funny little graphics. When I use this process, however I have only been able to have my own graphics on the screen at any one time rather than a mix of DIY and Vic characters. Yet I have seen many games where that is used. Why does it not work when I use it?

There is indeed a simple way to mix DIY and VIC graphic characters. You use the standard method to get your DIY characters — except that for some (or most) of these characters you use the standard Vic character. You can arrange this either by copying the whole of the character generator ROM down to your DIY generator, or just the characters you need. Which method you use obviously depends on how many of the standard Vic characters you want to keep.

A commercial program I bought recently has a line in it which won't LIST. It is part of the program to prevent illegal copying, not that that was what I was trying to do. No, what intrigues me is how this odd little line is missed out when the machine is told to LIST. If you type LIST25 it appears for a fraction of a second and is then gone. Can I do this? I can think of lots of fiendish applications for it.

So you want to stop a line listing, eh? Well, make sure that no-one is peeping over your shoulder and I'll drop you the secret.

Turn your Vic on and do *exactly* as I say. First key in a line 10 and a line 30 — it doesn't matter what you put into them — to represent the rest of a large program. Now get ready for an unlistable line 20. Type in this line

```
20 A = 5:REM""
```

but don't press RETURN yet. Now delete the second quotes, hit the INS key 13 times, and then the DEL key 13 times. Press RETURN: and there is your unlistable line!

All you have done is to fool the Vic into taking the delete characters into the text of the line, instead of deleting a character each time you press the DEL key. When you LIST the line, though, the DEL characters are acted upon; and they delete the characters in the program line as soon as they are printed. As you said, the line is listed and then quickly erased.

Dear Tommy, In direct mode, bash out four spaces on your Vic: then open inverted commas and type the name of a file that you want to load from tape. Now bring the cursor back to the beginning of the line using cursor lefts and press SHIFT-RUN.

Hopefully the display looks like this:

LOAD <filename>
PRESS PLAY ON TAPE
SEARCHING FOR <filename>

Everything seems fine so far, but when I have tried this method (unorthodox as it is) I have had three different responses:

1. **Sometimes it works: the correct file is loaded and executed.**
2. **Other times the Vic replies FOUND followed by some garbage, completely ignores it and carries on searching until you realise it has crashed.**
3. **On other occasions it finds the file and immediately gives an OUT OF MEMORY error, even though the machine is completely clear and the file should fit in easily.**

As I say, I know it is not a recognised method of loading a file; but that's beside the point. Could you tell me what is going on in the Vic's confused little head?

I am afraid that I cannot see any reason why this should not work, and I tried it on my Vic without any problems at all. When you press SHIFT-RUN, one part of the Vic operating system forces the characters LOAD into the keyboard queue, followed by a carriage return. Another part of the operating system takes them out and types them on the screen, just as if you had typed them on the keyboard. When the operating system finds a carriage return, the whole of the current screen line is taken into the Vic memory to be decoded and executed. At the time this happens, the Vic doesn't know whether it typed the characters on the screen or whether you did — or even, as in this case, whether you shared the job between the two of you.

I can think of several reasons for your problems:

- You have a fault on the Vic. Does it always function correctly apart from this problem?
- You are doing some nasty POKEs in another program which are upsetting the Vic. Does this happen if you just turn the Vic on and try your procedure as the first thing you do?
- It is being caused by an add-on device such as a ROM cartridge. If you are running with such a device, try taking it out and then trying your little trick.

Tommy is our resident technical expert. All the technical queries we get on the Vic are passed straight on to him, and nearly all of them will get a reply — usually in this column of the magazine rather than a personal missive, though you might just be lucky.

Dear Tommy, In the April issue of your magazine you gave some Pet-Vic memory conversions, some of which were useful to me. But I have an important program written for the Pet and some of the memory locations were not given. Please could you give me the Vic 20 equivalents of:

623
158
144
167
216

When converting PEEKs and POKEs from one machine to another, there is always the possibility that there may be problems in just changing the address; the function may have changed slightly.

You should however be all right with these locations. The only one which might cause trouble is the interrupt vector. This is most likely being used to disable the STOP key so that you don't stop the program in the middle and waste a couple of hours keying. Gazing into my crystal ball, I'd guess the statement in question will read **POKE 144,49** (Commodore 3032) or **POKE 144,88** (4032 and 8032).

On the Vic this should read **POKE 788,194.** However, this will not work with some of the add-on Vic cartridges — they modify the interrupt vector for their own nefarious purposes. If you have a ROM cartridge which alters this location (it is normally 191, so you can check this by PEEKing location 788) the solution is probably to delete the statement which alters 788 and trust to luck that you miss the STOP key. If you do press it by accident, you may be able to recover by clearing the screen and typing in CONT.

After all that waffle, here are the conversions you wanted:

Pet	Vic	
623	631	Basic keyboard queue (typehead buffer)
158	198	Number of characters in queue
144	788	Interrupt vector (see text)
167	204	Cursor flash switch. Setting this location to zero before a GET statement makes the cursor flash
216	214	Current cursor line number

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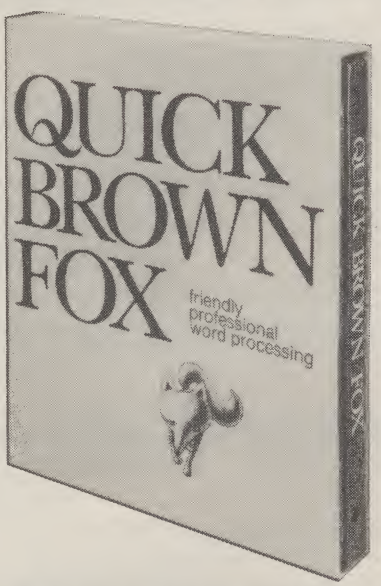

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SEE US ON STAND 30 AT THE INTERNATIONAL WP EXHIBITION, WEMBLEY 24th–29th MAY

Three machine-code routines

by Matthew Kendall

Colour border

```
5 PRINT"■"
10 N=833
20 READD:IFD=-1THEN50
30 POKEN,D:N=N+1:GOTO20
40 DATA162,22,173,64,3,157,255,29,169,6,157,255,149,202,208,242,234,162,22,173,6
4,3,157
45 DATA227,31,169,6,157,227,151,202,208,242,96,-1
50 POKE832,81
60 PRINT"■■■■■■■■■■      A BORDER":GOSUB500:SYS833
70 GOSUB500:PRINT"■    CHANGE IT...":GOSUB500
80 POKE832,90:SYS833
90 GOSUB500:PRINT"■      FLASH IT":GOSUB500
100 D=500:FORN=1TO3:GOSUB600:NEXT
110 GOSUB500:PRINT"■       FLICKER":GOSUB500:D=0
120 FORN=1TO100:GOSUB600:NEXT:GOSUB500:PRINT"■"
130 PRINT"■■■■■■■■■■■■  THE CHARACTER SET"
135 FORF=1TO2:GOSUB500
140 FORN=0TO255:POKE832,N:SYS833:NEXT
145 NEXTF
150 PRINT"■":GOSUB500:PRINT"■■■■■■■■■  A MESSAGE":GOSUB500:GOSUB500
160 FORN=1TO9:READD:POKE832,D:SYS833:GOSUB550:NEXT
170 DATA2,25,5,32,2,25,5,46,32
175 PRINT"■
180 GOSUB500:END
500 FORT=1TO1000:NEXT:RETURN
550 FORT=1TO800:NEXT:RETURN
600 POKE832,255:SYS833
610 FORT=1TOD:NEXT
620 POKE832,127:SYS833
630 FORT=1TOD:NEXT
640 RETURN
```

Routine no. 1 prints a border at the top and bottom of the screen in any specified character.

Obviously this can be done in Basic with no real difficulty, but using a machine code routine has several advantages. It is very fast (in fact, Basic will take longer to evaluate the SYS call than the routine takes to produce the border). The routine is only 3 bytes long, an important consideration when writing for the unexpanded Vic. It does not use any Basic variables; the CHR to be printed is stored in one byte, again saving memory.

The routine can be loaded in two different ways, either via a Basic loader or by typing it in using the Commodore Machine Code Monitor cartridge.

Below is the disassembled listing and a list of decimal data corresponding to the values to be poked by the Basic loader routine.

The routine resides in the cassette buffer; so remember that it will need to be reloaded after loading, saving or verifying.

Loc	Op code	Label	Hex
0340		Var CHAR	
0341	LDX, 16		A2 16
0344	LDA CHAR	LOOP-T	AD 40 03
0346	STA($1DFF),x		9D FF 1D
0349	LDA 06		A9 06
034B	STA($95FF),x		9D FF 95
034E	DEX		CA
034F	BNE LOOP-T		DO F2
0351	NOP		EA
0352	LDX, 16		A2 16
0354	LDA CHAR	LOOP-B	AD 40 03
0357	STA($1FE3),x		9D E3 1F
035A	LDA, 06		A9 06
035C	STA($97E3),x		9D E3 97
035F	DEX		CA
0360	BNE LOOP-B		DO F2

Decimal data: 255,162,22,173,64,3,157,255,29,169,6,157,255,149,202,208,242,234,162,22,173,64,3,157,227,31,169,6,157,227,151,202,208,242,96.

Decimal start location: 832.

Call with: SYS (833).

To use: POKE 832, ASC("desired character").

Half-screen invert

```
10 N=832
20 READD:IFD=-1THEN50
30 POKEN,D:N=N+1:GOTO20
40 DATA162,242,189,255,29,73,128,157,255,29,
202,208,245,169,6,162,242,157,255,14
9,202
45 DATA208,250,96,-1
50 PRINT"■■■■■■■■■■PRESS A KEY"
60 GETT$:IFT$=""THEN60
70 SYS832:GOTO60
```

This routine will invert the top 11 lines of the screen — any character in reverse field will appear normal, and vice versa.

This obviously has applications in games where the top half of the screen is used for graphic display and the bottom for game status (score, fuel, etc.) for explosions and the like.

The routine again resides in the cassette buffer.

Below is a disassembled listing of the routine and a list of decimal numbers to be poked by a Basic loader routine.

Loc	Op code	Label	Hex
0340	LDX, F2		A2 F2
0342	LDA ($1DFF,x)	LOOP 1	BD FF 1D
0345	EOR, 80		49 80
0347	STA ($1DFF,x)		9D FF 1D
034A	DEX		CA
034B	BNE LOOP 1		DO F5
034D	LDA, 06		A9 06
034F	LDX, F2		A2 F2
0351	STA($95FF,x)	LOOP 2	9D FF 95
0354	DEX		CA
0355	BNE LOOP 2		DO FA
0357	RTS		60

Decimal data: 162,242,189,255,29,73,128,157,255,29,202,208,245,169,6,162,242,157,255,149,202,208,250,96.

Decimal start location: 832.

Call with: SYS (832).

Half-screen scroll

This routine will scroll the top 11 lines of the screen from left to right. This has obvious applications in games programs, for moving graphics, prompts and instructions — either alone or in conjunction with the Half Screen Invert routine. Characters going off the right hand end of the screen are lost, and spaces (character 32) replace those from the far left.

This routine also resides in the cassette buffer.

Below is given a dissassembled listing of the routine and a list of decimal numbers to be poked by any Basic loader routine.

Loc	Op code	Label	Hex
0340	LDX,F1		A2 F1
0342	LDA($1DFF,X)	LOOP	BD FF 1D
0345	STA($1E00,X)		9D 00 1E
0348	DEX		CA
0349	BNE LOOP		DO F7
034B	LDA, 06		A9 06
034D	LDX, F1		A2 F1
034F	STA($95FF,X)	COLOR	9D FF 95
0352	DEX		CA
0353	BNE COLOR		DO FA
0355	LDA, 20		A9 20
0357	LDX, 00		A2 00
0359	STA(1EOO,X)		9D 00 1E
035C	STA(1E16,X)		9D 16 1E
035F	STA(1E2C,X)		9D 2C 1E
0362	STA(1E42,X)		9D 42 1E
0365	STA(1E58,X)		9D 58 1E
0368	STA(1E6E,X)		9D 6E 1E
036B	STA(1E74,X)		9D 48 1E
036E	STA(1E9A,X)		9D 9A 1F
0371	STA(1EB0,X)		9D BO 1E
0374	STA(1EC6,X)		9D C6 1E
0377	STA(1EDC,X)		9D DC 1E
037A	RTS		60

Decimal data: 162.241.189.255. 29.157.0.30.202.208.247.169.6. 162.241.157.255.149.202.208. 250.169.32.162.0.157.0.30.157. 22.30.157.44.30.157.66.30.157. 88.30.157.110.30.157.132.30. 157.154.30.157.176.30.157.198. 30.157.220.30.96.

Decimal start location: 832.

Call with: SYS (832).

```
10 READL
20 READA$
30 IFA$="*"THEN500
40 A=ASC(A$)-48
50 B=ASC(RIGHT$(A$,1))-48
60 N=B+7*(B>9)+(16*(A+7*(A>9)))
70 POKEL,N:L=L+1
80 GOTO20
90 REM DATA IN HEX.
92 REM 1ST DATA IS
94 REM STARTING LOC.
96 REM DATA TERMINATED        BY "*".
100 DATA 832,A2,F1,BD,FF,1D,9D,00,1E,CA,D0,F7,A9,06,A2,F2,9D,FF,95,CA,D0,FA
110 DATA A9,20,A2,00,9D,00,1E,9D,16,1E,9D,2C,1E,9D,42,1E,9D,58,1E,9D,6E,1E,9D,84
,1E
120 DATA 9D,9A,1E,9D,B0,1E,9D,C6,1E,9D,DC,1E,60,*
500 REM *MAIN ROUTINE*
510 REM *  CALL WITH  *
520 REM * SYS(832)
```

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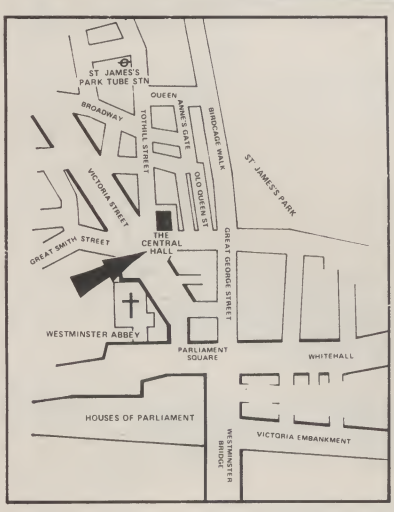

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Print at . . .

```
1000 IF X=0 THEN PRINT"■";:GOTO 1020
1010 POKE214,X-1:PRINT
1020 POKE211,Y:RETURN
```

Many versions of Basic have a PRINT AT facility — but not the Vic's. This neat little routine from Chris Durham adds to the standard facilities by letting you specify row and column for the start of printing.

```
10 X=5:Y=10:GOSUB1000:PRINT"TEST"

WILL PRINT 'TEST'
STARTING AT COLUMN 10 IN ROW 5
```

"What do you mean you didn't SAVE the program before unplugging the thing?"

HOW THE VIC DISPLAY CONTROLS APPEAR IN LISTINGS PRINTED ON THE 1515:

```
CLR          ...    ■   (REVERSED HEART)
HOME         ...    ■   (REVERSED S)
RVS ON       ...    ■   (REVERSED R)
RVS OFF      ...    ■   (REVERSED UNDERSCORE)

CURSOR UP    ...    ■   (REVERSED SHIFTED Q)
CURSOR DOWN...      ■   (REVERSED Q)
CURSOR LEFT...      ■   (REVERSED UPWARD BAR - SHIFTED H)
CURSOR RIGHT..      ■   (REVERSED LEFT SQUARE BRACKET)


SET COLOUR TO:
        BLACK ...   ■   (REVERSED SHIFTED P)
        WHITE ...   ■   (REVERSED E)
        RED   ..    ■   (REVERSED £)
        CYAN  ...   ■   (REVERSED COMMODORE-SHIFTED *)
        PURPLE...   ■   (REVERSED COMMODORE-SHIFTED -)
        GREEN ...   ■   (REVERSED UP ARROW)
        BLUE  ...   ■   (REVERSED LEFT ARROW)
        YELLOW...   ■   (REVERSED PI SIGN)
```

Unexpanded Hi-Res

by Matthew Kendall

```
10 PRINT"■READ LINES AT BEGINING■   OF PROGRAM FOR     ■    INSTRUCTIONS.":END
50000 HI RES PLOTTER.
50010 INITIALIZE WITH
50020 GOSUB 55000.
50030 TURN POINT X,Y
50040 ON WITH GOSUB
50050 "60000.
50055 TURN READ X,Y
50060 OFF WITH GOSUB
50070 "60200.
50500 RETURN TO TEXT
50510 MODE (NORMAL
50520 MODE) WITH
50530 GOSUB 60500.
50540 "_____
55000 PRINT"■":POKE36865,68:POKE36867,22
55010 FORN=0TO241:POKE7680+N,N:POKE38400+N,2:NEXT
55020 POKE36869,253
55030 FORN=0TO1024*2:POKE5120+N,0:NEXT
55040 RETURN
60000 R=INT(Y/8):C=22*R+INT(X/8)
60010 T=Y-INT(Y/8)*8:Z=X-INT(X/8)*8
60020 POKE5120+C*8+T,PEEK(5120+C*8+T)OR2↑(7-Z)
60030 RETURN
60200 R=INT(Y/8):C=22*R+INT(X/8)
60210 T=Y-INT(Y/8)*8:Z=X-INT(X/8)*8
60220 POKE5120+C*8+T,PEEK(5120+C*8+T)AND255-(2↑(7-Z))
60230 RETURN
60500 POKE36869,240:PRINT"■":POKE36865,38:POKE36867,46
```

This will allow you to define a custom character set (initially all blank) then alter it to plot or unplot points on a 176 × 88 matrix. it divides into four separate sections:

• **Lines 55000 on** set up the blank character set, clear the screen and print the new characters in order on the screen. Because only 11 lines of screen are used the screen is reduced in size and recentered.

• **Lines 60000 on** set a point. The x co-ordinate is contained in **X**, the y in **Y**. As the characters are printed in order across the screen it is a simple matter to determine which character the desired point appears in and change it accordingly.

• **Lines 60200 on** are similar but reset the point contained in X and Y (ie. turn it off).

• **Lines 60500 on** return to normal mode. They return the character set to normal, enlarge to screen again and recentre it.

A simple Basic program to plot a sinewave on the screen might go as follows. . .

```
10 GOSUB 55000
20 FOR X = 0 TO 175
30 Y = SIN(X 25)*40 + 44
40 GOSUB 60000
50 NEXT
60 GETT$:IF T$ = "" THEN 60
70 GOSUB 60500
```

Dear Vic

VIC CLUB Denmark is the national Vic users group, publishing the VIC-DK magazine and promoting the members' inventions and programs.

Today nearly 370 users have joined, members being mainly young and amateur. Beside the normal club activities, VIC CLUB Denmark offers a membership subcription to Vic Computing and other foreign magazines; and the club generally emphasizes distribution of knowledge and hints from many sources.

VIC CLUB Denmark has (in spite of the close relations to 'official by the members learn to know eachother. Each and every day chairman Christian Edslev in Arhus gets phone calls from members, either for a chat or troubleshooting. The Danish Commodore people help the club members solve any problem, they might encounter, and VIC CLUB Denmark seems to be working fine as a link between users and the officials.

In Denmark Commodore systems manager Jan Nymand and his assistant Aage Monrad have been extremely helpful, even though Commodore Data Inc. is publishing its own magazine We & Vic.

The members however form the spine in VIC CLUB Denmark, contributing every day with their findings, their experiences and their programs. In Denmark people are not so afraid of each otehr; and EDP theft is hardly a problem with ud. The effect of this is that the members publish many of their programs and programming techniques.

In Denmark amateur programming started off with the single board computers (Nascom, UK-101, etc) and we have yet to overcome the weight of "transistor people", electronics freaks, and CB people. Computers like the Vic have improved the social balance among 'computomaniacs'; and VIC CLUB Denmark emphasizes every now and then that computing is by no means restricted to those who master their soldering irons, but merely a philosophy like Chess, imaginative thinking, open for everyone and with no demand for special skills such as electronics or CB communication.

Our friends at Commodore and **P.S. Micro** magazine strongly support our view. Neither of the employees have any specific EDP education. And we are certain that this is the reason why so many problems are solved more easily here than anywhere else: We don't have to deal with specialists, who never seem to know anything about the simple problems, our members encounter. We deal with ordinary people, who have themselves worked their way with computers, and who have been amateurs themselves. We use to say, that we do computing 'the Butterfield way'. And a great Commodore') maintained a critical attitude, especially to the pricing policy of Commodore and its marketing philosophy. On the other hand we recognize that many of the problems in Denmark (slow deliveries, shortage of peripherals) orginate in UK or Germany...

VIC CLUB Denmark is a small society in a small country. By and many people over here seem to recognize this as the only way.

Regards to all Vic Computing staff and readers!

Axel Bang, VIC CLUB Denmark.

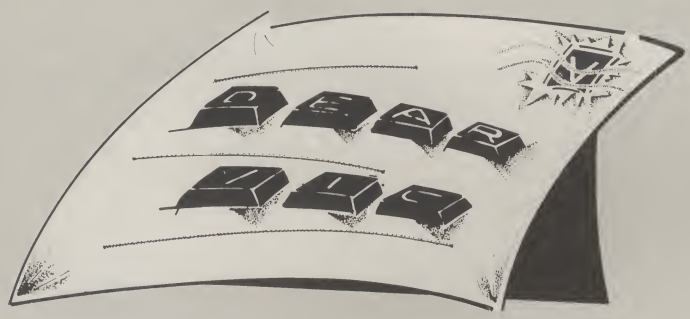
It is very encouraging to see that computer prices appear to be dropping, and it would appear that the trend will continue as Atari and Texas have reduced their price by approx £100. The Vic-20 has also dropped in price, much to the annoyance of the people who bought it when it was first released. Rumour has it that the new Vic will be even cheaper.

When the new Vics are released on to the market, surely it would be better or should I say fairer to early buyers if Commodore dropped the price of some of the add-on units or give a special discount for people who bought the Vic-20 before the price reduction?

D Clarke, Kington, Herefordshire

Should Commodore have to feel a sense of moral duty to people who bought Vics at the original price, any more than BL has to give previous purchasers some recompense if it drops car prices?

Dear, Vic...



I wonder if you could answer for me the following questions:

1. I want to purchase the Big Ears speech recognition unit but my Arfon unit lays claim to the Vic's user port. Does anybody produce a user-port splitter that would allow me to use Big Ears and my Arfon unit together?

2. I have noticed that if I use my Programmer's Aid cartridge with my Super Expander queer things happen. Sometimes when an error occurs and I use HELP the screen goes blank and nothing works. When I use KILL the output from the Function keys is rubbish and when I try to redefine them by using KEY the same thing happens as when I type HELP. Is there any way to stop this?

3. I have two 3K RAM packs — the Super Expander and an Arfon User-Definable Graphics pack. Is there any way that I can use these together to give me an extra 6K of user RAM?

4. I am writing a program using my Super Expander cartridge. Part of the program needs to show a radar display, but I can't figure out how to show random objects on this display. Could you please show me a subroutine to do this?

Stephen Kearon, Dublin

I would like to make some comments which I hope will be taken as constructive. When I bought my Vic a couple of months ago I was a complete novice: and I bought a wide selection of computer magazines and keyed in every Vic-orientated program and as a result of these experience (some still do not work!). May I now make some points.

1. Praise for Vic Computing — for the size of your program type. Please keep it this size as at least two other magazines vary the print size from minuscule (unreadable) to jumbo (unnecessary).

2. Praise for Vic Computing — for printing the programs intact. There is nothing more infuriating than trying to find the continuation of a listing which is printed in some obscure corner of the magazine (and sometimes completely missing!)

3. Problems for Vic Computing — sadly in my copy your graphics (Character Editor — by Andy Frinkel) were illegible. If this is a problem I think that the inclusion of hybrid instructions is preferable — eg CD, 3CR for 'cursor down, cursor right three steps'.

4. Some hope for Vic Computing — please could you take the occasional interesting program and explain it in complete detail, on a line by line basis: a sort of Diagnostics Anonymous for novices. I find that I can best appreciate the logic of a program where I can see it in context. Also where the program either contains bugs (or in my case mistypes) I can more easily locate the errors than through the Error Messages.

5. Another hope for Vic Computing — could someone provide more serious listings for non-game programs like home accounts, ledgers, statistics etc. After all, if they are available for the ZX81 why not Vic?

Incidentally there does not seem to be a user group around hereabouts. I obviously have not the technical ability to aid a group but I could easily organise a venue if there are enough people interested...

Graham Harvey,
Redditch,
Worcs.

Praise is of course always welcome, though it looks as though we might be about to lose a friend — we're experimenting with a slightly smaller type for listings. This should improve legibility, particularly of graphics characters, and it will allow us to get more into the mag.

As for the 'hybrid' instructions, we're coming round to Graham's views here: the graphics equivalents aren't always easy to figure out. A reader has sent in a partially completed conversion program which will automatically strip out all those graphics symbols and replace them with more comprehensible abbreviations: we're trying to complete it and debug it in time for the next issue's Victuals.

Diagnostics Anonymous is a good idea. We tried to do this with Rhino back at the start of the year, but the idea was dropped in favour of putting more listings into the space. Any other opinions?

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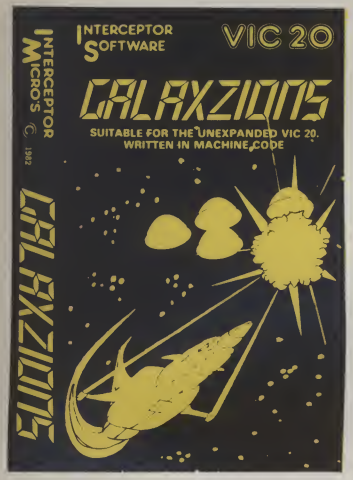

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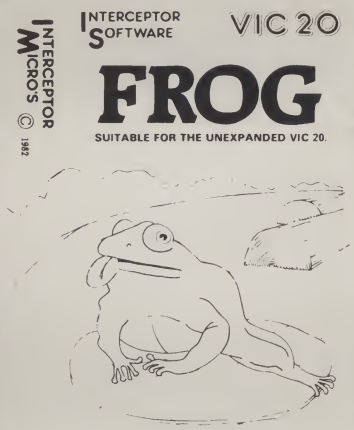

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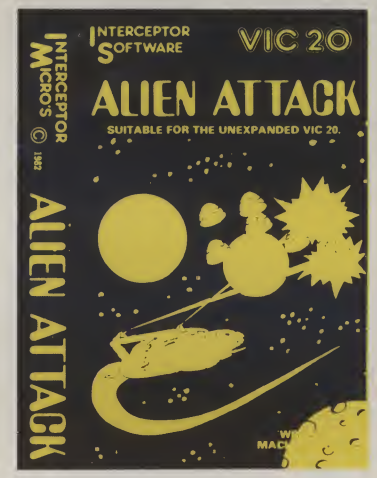

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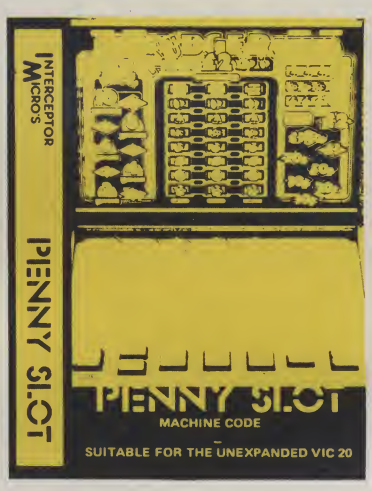

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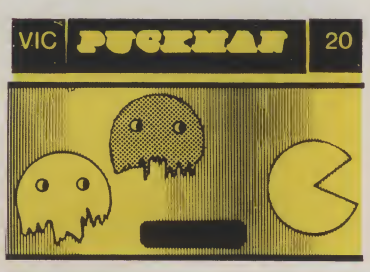

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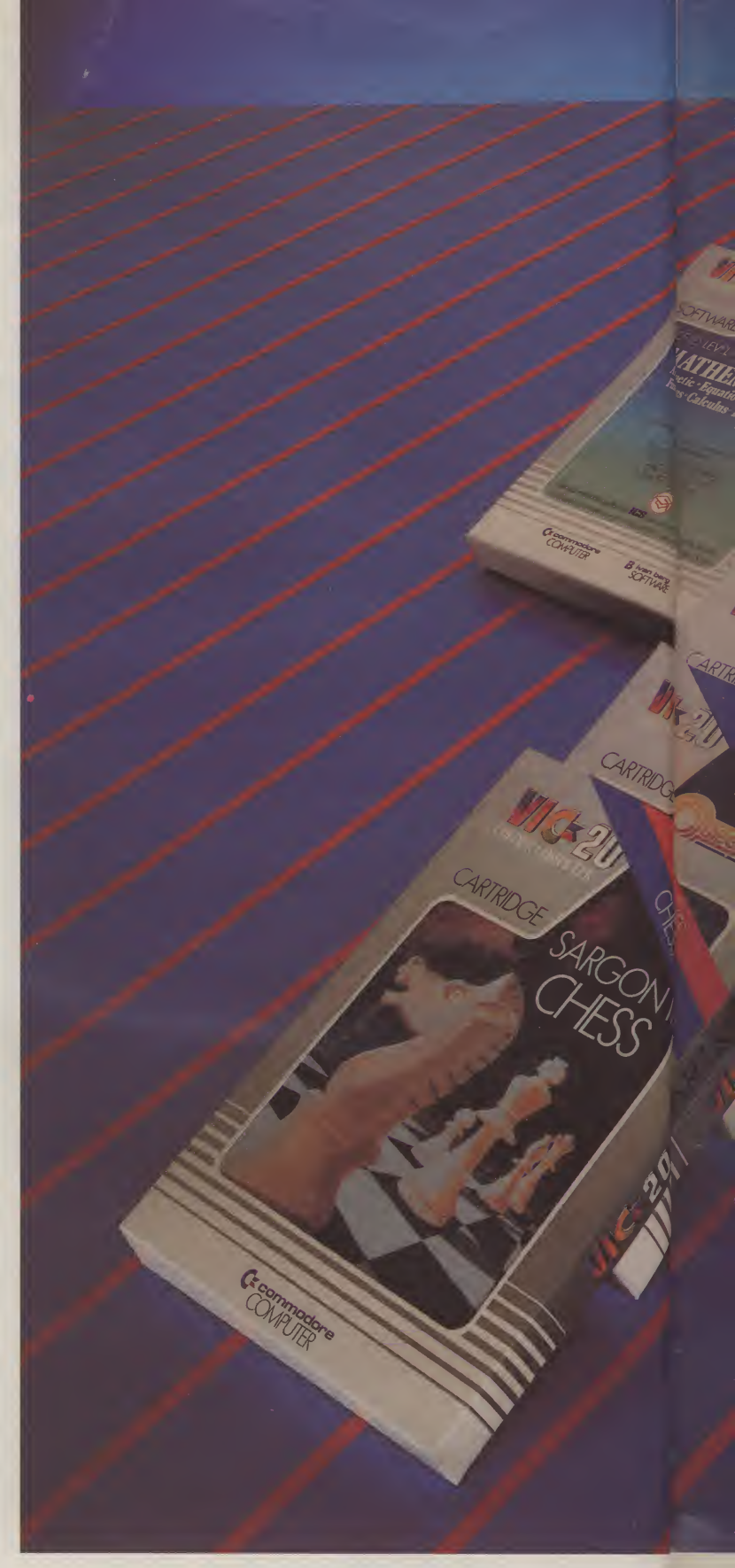

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VCVCO 4/83

I have a tip for owners of the Super Expander.

Perhaps you may have noticed the error in the quite well written manual. Page 4, column 2, paragraph 2 states correctly that 128 is normally the "maximum number of characters that may be assigned to any one function key". Correct, but then it goes on to say that "You may assign this number of characters to any or *all of the function keys*".

On attempting to do this using a program such as the one below, we always get the dreaded OUT OF MEMORY ERROR which in this case means the function key buffer is full. On investigation of the ROM, I discovered that 136 bytes are allocated to the keys: 128 bytes for key definitions and 8 bytes which store the number of characters allocated to each key.

Therefore, there are 128 bytes allocated to be shared amongst a few keys *or only one:* and not 128 bytes for each key, which the manual suggests.

```
10 FOR A = 1 TO 8 : KEY A,"" :NEXT
20 FOR A = 1 TO 128: A$ = A$ + "B" : NEXT
30 FOR A = 1 TO 8 : KEY A,A$ :NEXT
```

Although it is impossible to store more than 128 characters per key unless we rewrite the ROM, it is possible to increase the amount of Ram reserved for the keys to use 247 characters, 128 characters in F1 for example 119 in f2.

Incidentally, despite what the manual says the command key can be used in a program.

```
10 POKE 251,0 : POKE 252,29 :REM POINT TO START ADDRESS OF FN KEY BUFFER IE. 29*256 + 0 = 7424
20 POKE 55,0: POKE 56,29 : CLR : REM RESERVE 255 BYTES OF MEMORY.
30 POKE 673, 255 : REM SIZE OF FN KEY BUFFER
40 FOR A = 7424 TO 7679 : POKE A,0 :NEXT : REM CLEAR NEW BUFFER
```

Kevin Smart, Irvine, Ayshire

Am I the only Vic-20 user with an RS-232 printer? It seems that way, when it comes to getting information or buying software. When you do find anything on the RS-232 interface, it's on the modem only.

It's time we stood up and were counted. Let's have an RS-232 information exchange on printers and disks. Write to me and let me know any of your experiences with the RS-232 interface. If there are enough, maybe we can start our own users group.

The reason I ended up with this problem is as follows. This guy I work with had a rebuilt Data Products DP-50 daisywheel printer for sale: but little did, I know what was ahead. I bought a Quantum Data Model 1800 printer, which is an RS-232 interface connected to the user's port. Hey, this is great: now all I have to do is power up, and we are in business. WRONG! My first problem, it didn't line-feed. Everything printed on the same line. After many failures and much research, I found the answer. I had to use OPEN 128,2 or greater.

That was in May of 1982. Only you who have experienced this will know that wasn't the only problem. For you beginners here's a couple of hints.

To list a program, use this:

OPEN128,2,0CHR$(6):CMD128: LIST

Explanation: You must use greater than 127 for line feed (in this case 128). The 2 is the user's port device, the CHR$(6) prints in 300 baud.

To convert to a standard ASCII subroutine:

```
1000 REM STANDARD ASCII SUBROUTINE
1010 X = LEN(P$):IFX<1THEN 1060
1020 FOR I = 1TOX:X$ = LEFT$ (P$,I - 1):SS$ = MID$(P$,I,1): Z$ = RIGHT$(P$,X - I)
1030 Y = ASC(SS$):IFY>64ANDY <1THEN SS$ = CHR$ (Y + 32):GOTO1050
1040 IFY>192ANDY<219THEN SS$ = CHR$(Y-128)
1050 P$ = X$ + SS$ + Z$:NEXT
1060 RETURN
```

Boy, would I like to have a way to change some of the Vic printer programs to print on my printer!

Daryl E. Williams, Dew-Rite Enterprises, P.O. Box 1932, Santa Ana, Ca. 92702

Am I the only Vic-20 user with an RS-232 printer? It seems that way, when it comes to getting information or buying software. When you do find anything on the RS-232 interface, it's on the modem only.

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Daryl E. Williams, Dew-Rite Enterprises, P.O. Box 1932, Santa Ana, Ca. 92702

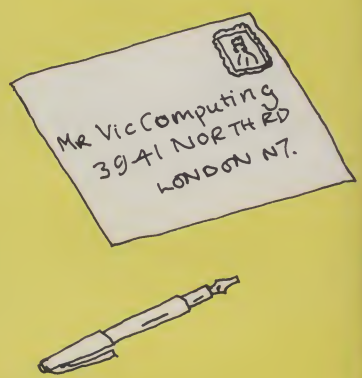
I have done a small mod to the Commodore cassette that may be of use to other users. One can on occasion waste a lot of time waiting to load a program that has not been found for one reason or another.

Viewing the sequence on the CRO showed that a program commenced with a fixed frequency tone (sine wave) of about 10 seconds. This allows the Vic to compensate for variations in the run speed of different recorders. Following this is the title data which appears as 'FOUND ... LOADING' on the screen. Another short tone precedes main program data.

To be able to hear this seemed desirable and a low gain amplifier using 741 op amp was constructed on a piece of PC board about 1.25in square. This was mounted inside the cassette and fed from the 'tape read' output connection on the cassette board. The output of the amplifier fed a miniature earphone mounted off the board by two pieces of stiff copper wire: a small speaker would be ideal. The output level from the earphone is sufficient without having to drill holes in the case.

While a technical description would probably not be appropriate for a computing magazine, it is fairly simple and inexpensive (after the warranty expires). Anyone who does not feel confident to tackle it should have no trouble finding someone to help.

Bill Williams, Ingle Farm, Australia



Pleased to see so many ROMs and other gadgets described including Forth, which you said had 100 words. The instructions:

4 4 0 OPEN 4 HPOUT V LIST

...produce 230 of them, and they are all implemented. Regrettably the handbook is terse and the reference books referred to are not available; but adequate details can be obtained from **Discover Forth** by Knect (Sams & Co), since the ROM made by Datatronic in Sweden uses a vastly-improved form of Fig-FORTH.

Unfortunately, some words require use of a disk and strings and decimals need a non-existent disk ... according to the instruction book.

I have however found that as any defined integer constant holds all data in ASC form, the non-existent Lefts, Mids, and Rights can be replaced by suitable use of (amend address) and CMOVE (transfer data) after ALLOT has been used to make room for them.

(Where, oh where, can I get hold of a Pet-Forth Handbook?)

Best wishes for a useful magazine.

Peter Bond, London N11

Send us comments, queries and complaints: we'll answer everything we can and print anything that isn't boring or illegal. Address yourself to The Editor, Vic Computing, 39-41 North Road, London N7 9DP

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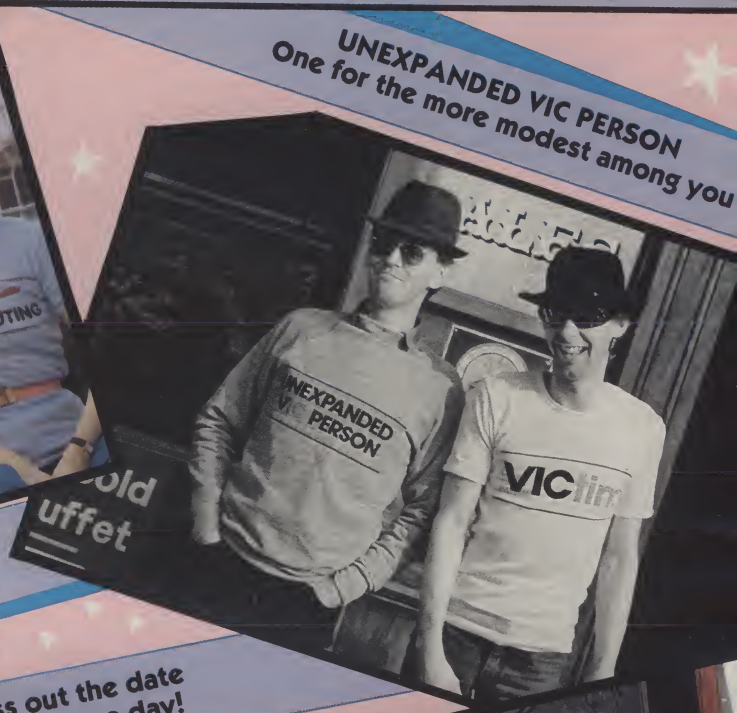

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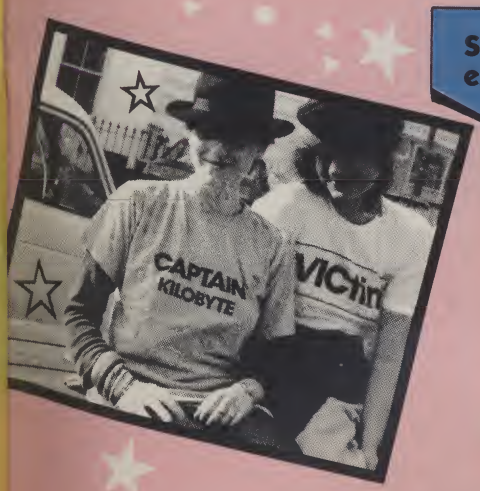

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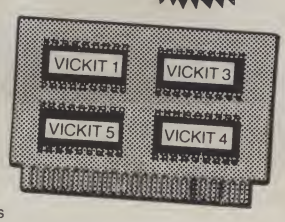

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